

MANUAL OF  
CULTIVATED  
PLANTS

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BAILEY





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# MANUAL OF CULTIVATED PLANTS

A FLORA FOR THE IDENTIFICATION OF THE MOST  
COMMON OR SIGNIFICANT SPECIES OF PLANTS GROWN  
IN THE CONTINENTAL UNITED STATES AND CANADA  
FOR FOOD, ORNAMENT, UTILITY, AND GENERAL  
INTEREST, BOTH IN THE OPEN AND UNDER GLASS

BY  
L. H. BAILEY

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PART I  
EXPLANATIONS



## THE PURPOSE

The purpose of this book is to provide a ready means for the identification of the species in the usual domestic flora of the continental United States and Canada.

It is manifestly impossible to describe within the limits of a single volume all the plants that may be in cultivation in the territory. Many species are known only in botanic gardens, experiment stations, test-grounds, or in the collections of specialists and fanciers. To attempt to include these species would make a work of unmanageable size, and the subject would necessarily be greatly complicated for the general student; moreover, the species in these institutions and collections are usually well known to those who grow them. Any number of native plants are also likely to be transferred to grounds and many of them are offered by dealers; one never knows what species these may be; to include them all would introduce into the book a good part of the native flora and duplicate the field of the regular manuals of American plants. Most of these native species are not cultivated plants in the sense in which the term is understood in this book, even though they may be planted in grounds: they have not become familiar citizens of gardens, nor have they given rise to varieties and races under cultivation; that is, they are not domesticated.

Persons desiring to go further in the subject must consult special monographs. The *Standard Cyclopedia of Horticulture* is also available, in which 20,602 species are accounted for, although the *Cyclopedia* does not include all plants cultivated in North America. Gray's *Field, Forest and Garden Botany* has been useful in the identification of cultivated plants for more than fifty years. The present *Manual* includes 3,665 species (in black-face type) and 1,246 genera in 170 natural families, of which 167 are regularly numbered, aside from many Latin-named varieties and incidental references to other plants.

The user of this book must understand that it deals only with species. To include horticultural varieties, even those bearing Latin names, would greatly increase the bulk and complexity of the volume. The number of Latin-named varieties in the *Standard Cyclopedia of Horticulture* is 6,715. Moreover, the identification of these varieties constitutes quite another problem, and one that is essentially yet new. The varieties must be worked out in mono-



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graphic treatments for the use of specialists and of professionals who have charge of test-grounds, parks, landscape-gardens, and investigational work. To describe the main varieties of cultivated plants, even those customarily meriting Latin names, requires long and painstaking study, collections for the most part not in existence, historical perspective, a special application of nomenclature, and an appreciation of systematic values yet little developed.

Although the purpose of this book is to describe the species most commonly cultivated, there are three classes of rather marked exceptions: (1) Many plants not offered by dealers nor appearing in printed lists are in cultivation in old premises and private gardens, and are likely to be exchanged from hand to hand; these plants have established themselves in the affections of growers and they should be recorded, even though not common or perhaps in the process of passing out in a commercial epoch. (2) Species of rather recent introduction that promise to be acquisitions but which are not yet well known; it is impossible to forecast which ones are likely to become fairly common or established. (3) Certain species of great historic interest in Europe and other countries that should be known as a matter of general knowledge but which may be little cultivated in North America; an example is *Lupinus albus*, lupine of the ancients and still grown in parts of Europe for human food, forage, and green-manuring, but rarely seen in this country; in this category are many food-plants likely at any time to awaken interest here, and also such things as are frequently grown in "economic collections"; these subjects are always interesting to students in the educational institutions. While some of the species in these three categories may not be common, they may nevertheless be significant to man or to the development of horticulture and agriculture, and therefore are in place in the book.

The limits of the book are necessarily indefinite and subject to personal judgment. What species may be omitted without loss and what should be added will develop with the use of the book; the results may be recorded in a subsequent edition.

The plants entered in this volume represent all parts of the world. They bring the names now current among the specialists of different countries. The application of the International Rules of Nomenclature naturally follows.

The botany or phytography of the species included in this volume, coming from the ends of the earth, is likely to be considerably modified by subsequent investigation. Cultivated plants have not been the subject, for the most part, of critical systematic study, and the knowledge of them is frequently inexact. Such

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plants have been taken for granted or have been considered to be outside the range of regular botanical work. Origins have now been lost. There is little "type" or authentic material. Even as to the wild species from which they come, there is little uniformity of treatment inasmuch as they represent widely separated floras that have been treated by different minds without reference to each other. An author working with the flora of some part of South America, for example, may have a very different conception of his species from one studying the flora of China. When species of a group from these two regions are brought together in a book like this Manual, it may be found that the species-concepts are different in the two cases and that the descriptions do not employ comparable characters. It therefore follows that the situation does not yet admit the consistency of diagnosis to be expected in a flora describing the plants of a single and more or less homogeneous region. Moreover, some of the stocks from which domesticated subjects are descended have not been restudied in modern time; the knowledge of cultivated plants must largely await the critical re-examination of the original species in the countries of their nativity. Anticipating considerable changes, this book is printed directly from type, the composition not having been cast in plates.

In the study of the flora of a region, the habitat and range afford clues to the species; but with cultivated plants such aids are usually not available, as even the part of the world from which a given subject comes may be wholly unknown to the collector; one must approach the subject in a different attitude and rely on diagnoses alone. In this Manual, the tendency is to conceive genera and species rather broadly. It is easy to go to such a degree of refinement that the subdivision ceases to have utility.

So far as possible, the original orthography is followed in the name unless there is evidence of misprint or error. Thus *Wisteria* is written as originally spelled, even though it is made in compliment to Caspar Wistar (a family name sometimes spelled *Wister*); names of plants are not primarily commemorative; Nuttall had the right to spell his genus as he chose, and he may have considered *Wisteria* a more conformable and euphonious Latin; at all events, he appears to have so spelled the name deliberately. Similarly, *Kennedia* is restored to its original spelling, although named for Lewis Kennedy; there is no *y* in words of original Latin, and undoubtedly Ventenat preferred to follow classical form. Similar cases occur in *Malcomia* and *Mathiola*; Robert Brown was a critical student, and his spelling of these generic names must be accepted as intentional.

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A word should be said in explanation of the color designations. The colors of flowers, leaves, and fruits are indicated only in a general sense. Thus, if in keys or diagnoses flowers are said to be "yellow," it is meant that they are of the yellow series rather than of the red, blue, or other series, and no attempt may be made to distinguish the particular kind or degree of yellow. In cultivated plants, it is difficult briefly to state distinctions of colors that may arise within a species; but the special point to be understood is that the purpose of citing color in diagnoses of this kind is only to aid in identification of species, and the citation is never intended as a color analysis or discriminating appreciation.

It may interest the reader to know that a book of this kind was begun by the author more than forty years ago. In the meantime he has maintained his interest in the subject, ever with the hope that the present volume might eventuate. It has required the growing of very many of the species and the assembling of a considerable herbarium collection. So far as possible, the diagnoses in the book are drawn or verified from the specimens themselves. The book is, therefore, not a compilation, but is written new.

So far as the author is aware, there is no other manual of this kind in any language, in which the domestic flora of a country is attempted to be separately covered from the point of view of the systematic botanist. The subject is one of special perplexity because plants from many parts of the world must be placed in juxtaposition; this requires the contrasting and keying of species that may not have been associated in this way before. In fact, this perplexity is marked even with plants from Europe, inasmuch as there is no descriptive flora of that region as a whole.

The author hopes that this limited and imperfect book may be a contribution to both botany and horticulture: to botany by suggesting a delightful and promising field for keen biological study; to horticulture by stimulating definiteness and exactness in the knowledge of the kinds of plants. The study of the species of plants that chance to be subjects of cultivation should be approached in the same spirit as is the study of those that happen not to be cultivated.

Throughout the work the author has had the devoted aid of his daughter, Ethel Zoe Bailey, in both the botanical and editorial sides, as well as in the development of the herbarium on which so much of the enterprise is based. In the later months, Dr. Lulu M. Newlon, attached to the office and herbarium, has written many of the diagnoses.



## THE HERBARIUM

If one is to make a serious effort to study the species of plants, one must keep a record of them. This record is an herbarium; and an herbarium is prepared by properly pressing, drying, and mounting the plants.

Assuredly, plants should be studied as far as possible in the growing state; but a record of them is essential. They must be preserved for future consultation. One must go to them again and again for verification and to make new comparisons and to refresh the memory, as one returns again and again to printed descriptions, to photographs, to documents, and to other evidences.

Moreover, it is not often possible to obtain fresh specimens of related kinds at the same time for comparison; they do not last long; memory soon becomes dim and faulty. For it must be known that the identification of species is not accomplished accurately by easy observation of striking or superficial characters. One reason why the species of cultivated plants are so little understood is because good preserved specimens are not available. The habit of critical study of them cannot be developed in living specimens alone.

In the careful study of cultivated plants one must distinguish between features that are pleasing or useful to a grower and those more permanent and perhaps subtle characters that mark a series or species as a whole. Such technical botanical characters are common to domesticated plants as well as to wild ones.

To one accustomed to look first to the external beauty or yield of a plant, a dried pressed specimen may seem a meaningless object, but to the trained eye its characters are full of significance. The habit of the plant is shown in many cases; whether hairy or glabrous, and the character of the hairiness; the arrangement, size, and shape of leaves, with serratures, veining, glands, pubescence, and other marks; the flowers, even though pressed, retain their main features, and the student knows how to boil a dry flower, to dissect it, and to discover its intimate structure; the fruits and seeds, even when more or less fleshy, may also retain their essential characters. The botanist is able to make a correct description from good herbarium material, and the characters he uses for his diagnoses are consequently those that are least transient.

Such features as are likely to vanish in the curing of the dried specimen should be seen, if possible, by the student; if he cannot see the growing plant, then these features should be recorded by

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the collector in written notes or on the label; such characters as color and fragrance of flowers and sometimes the time of day in which they open are thus to be noted. Special coloration of foliage is often an important diagnostic character; dates should always be given. If an herb, whether annual, biennial, or perennial may well

be stated. The complete method is the living plant for direct observation and the herbarium specimen for subsequent study and record.

If the student has several species under consideration or is concerned with the flora of a region or of gardens, he cannot assemble all the needful living material at one time; and he must make comparisons between many specimens. He cannot bring together living flowers and fruits in good condition at one moment.



FIG. 1. A single specimen on a sheet.

He cannot submit such specimens to specialists for determination. He must keep his specimens until sufficient supply accumulates to afford him a dependable basis for study.

Most species of plants were first described from dried specimens. If we were obliged to make diagnoses from living subjects alone, the plants of the world would yet be mostly unknown. Plants can seldom be named as they are collected in the wild. They must be compared with other specimens that have been the subject of careful study. Books must be consulted. In exploration, the col-

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lector is not often able to determine his discoveries. He will not have time or facilities. He probably will not know what is new. The facts are brought out after the collection is gone over carefully by students of the region or by specialists in different groups.

Even in cultivated plants, it may not be possible to name them offhand. Often the determination requires much study, with consultation of authorities. In the case of hybrids and marked variants, the need for cautious study without haste is especially great.

These remarks are intended to explain the importance of a good herbarium collection to the study of species of plants and to say that there is special need of such material for cultivated plants. Photographs of the living plants are good supplements to pressed specimens but are by no means substitutes for them. The drying of flowers and leaves as souvenirs does not produce herbarium material, however much these fragments may add, as do other mementoes, to the remembrance of places and journeys. Real herbarium specimens are attached on separate sheets of suitable size, so that they may be arranged according to a system and so that any number of them may be taken out for study. A good herbarium is a card index to the vegetable community, the plants themselves being on the cards.

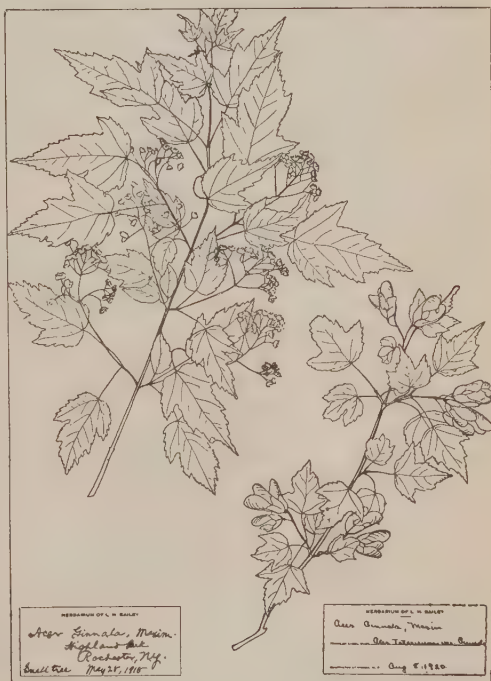


FIG. 2. Two collections on a sheet.

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### *How to make the herbarium*

The specimen should be put in press when fresh and dry, before it wilts. It should represent the entire plant, if the plant is only a foot or two high, with root and top; or a characteristic part if the plant is larger. A standard herbarium sheet in North America is  $11\frac{1}{2} \times 16\frac{3}{8}$  inches; the specimen when put in press should come within these bounds or be capable of being trimmed to these limits. Bulbs and other thick parts may be split. Very large fruits and seeds are separately preserved. Specimens may be bent over or folded, as shown in Fig. 1. So far as possible, the specimen or specimens on a single sheet should show the essential technical nature of the plant; height, habit, color, duration, and other features, as well as habitat and date, may be entered on the label.

The press consists of blotting-papers or soft builder's felts cut to about  $12 \times 18$  inches. Ordinary blotting-paper is too thin and fragile for the work. Botanical supply-houses carry regular stock suited to the purpose. For a few specimens and not of fleshy plants, several thicknesses of newspaper may be used. The specimen is preferably put in a folder (to serve as a carrier and to keep it in place), which is a double sheet of newspaper or similar material, and this folder is laid between the driers. At first the driers are changed every day, but the specimens are not removed from the folders—the folders are merely slipped from one pile to another into dry driers. The folder keeps the specimens straight and any detached parts are not lost out.

A heavy weight is placed on the pile, heavy enough to flatten the specimens out. In traveling, strong straps or cords may be drawn around the bundle—which is provided with stiff sides—but unless the straps are tightened as the plants dry, the pressure will soon be released and insufficient. Some plants dry and cure in four or five days; others require as many weeks. Ten days to two weeks is the usual time with most specimens. Special methods of drying and pressing are known to botanists, to whom the intending collector should apply for suggestions.

Although the specimens are not taken from the folders when changed, yet the folder should be opened to see that the plant is drying properly; at the first changes, the leaves and other parts should be straightened out and arranged. Crumpled, twisted, broken, bunched, and scrappy material is not worthy the name of botanical specimens. The collector should train the eye to choose specimens that will make trim, neat, and attractive objects on the sheet.

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The specimens are mounted on strong rather stiff white paper, such as may be secured from supply-houses. In large herbaria, where the sheets are much handled, the specimens are glued down tight, strong fish glue being used. In private collections, specimens are sometimes held to the sheets by strips of gummed paper, but this practice is not recommended. Extra flowers and small loose parts are placed in specially folded envelopes or "pockets" glued on the sheet. The specimen should be so placed on the sheet as to make a good presentation. If the specimen is small, it is placed at one side of the sheet, as it looks better than when mounted in the middle and it also allows of another specimen being placed on the same sheet, as in Fig. 2. Of course, only one species or variety should be mounted on the sheet.

The mounted sheets are placed, face up, in heavy manila folders known as genus-covers. These covers are cut so that they fold a trifle larger than the size of the sheet itself; the usual size, when folded, is  $11\frac{7}{8} \times 16\frac{1}{2}$  inches. On the lower left-hand corner the name of the genus is written.

In mounting, all broken or unnecessary parts are trimmed away, dirt is taken from the roots, and the specimens in general cleaned up and made shapely. The collection is kept in tight cases or cupboards, free from dust, mold, and insects. The genus-covers are laid flat on the shelves; and the sheets in each cover should not be so many as to make a bunched unwieldy pile. The covers should lie flat one above another, in compartments or pigeon-holes about 6 inches high.

### *How to send specimens for identification*

If one has dried unmounted specimens, they may be sent by mail loose in the folders between cardboards; or mounted sheets may be placed between soft paper and heavy flat cardboards at least as large as the sheets, strongly wrapped and tied.

Or one may send fresh specimens to a botanist for determination. If the distance is not great, so that the parcel will not be more than a day or two on the way when provided with a special-delivery stamp, the living specimens may be sent loose in a strong box as cut-flowers are mailed. Usually, however, it is best to send fresh specimens flat just as if they were put in press. Never roll them or do them up in cotton. All available data should be supplied, as the source of the specimen, size of plant, color, and other special characteristics. Let the specimen be ample enough to show the full character of foliage, the inflorescence and flowers, and, whenever possible, the fruit and seeds.



## TERMS AND NAMES

Herewith is presented in one list (1) a glossary of the principal terms employed in the technical descriptions in this book, aside from such special ones as are explained where they occur; and (2) the names of species, with indication of primary pronunciation and their equivalence in English.

The descriptive terms are in *italic*, and begin in each case with a capital letter; the specific names are in **black type** and begin with a small letter. In many cases, the technical term and the specific name are forms of the same word, and they need not be repeated in the two lists: *Campanulate* is explained in the glossary part and it is unnecessary to repeat the Latin form **campanulatus** in the name-list part; nor to explain **pinnatus** when *Pinnate* is given; nor to translate **subcordatus** when *Sub* and *Cordate* are entered in the glossary.

It is not necessary to an understanding of a plant that the species-name be translated into English; yet the student is interested to know what the word means; and the following list is inserted to supply this knowledge for characteristic Latin or Latinized descriptive adjectives applied to the species of plants. These words are likely to be used in differing meanings in different genera and as applied by different authors; in many cases, they do not follow the usages of classical Latin; therefore a list of this kind cannot be exact or give all the meanings in which the words may be applied as specific names. The name may be even inapplicable, yet it must stand if it has priority and meets the other conditions laid down by long botanical usage. Thus, *Duranta repens* is not repent or creeping, the name having been applied under a misapprehension; yet the name *repens* holds as against the better known *D. Plumieri*. In a cultivated species, the plant may have varied so as to contradict the original name, yet the name must hold; examples are frequent in plants with color-races, as in *Nymphaea alba*, named for its white flowers, which sometimes vary to red: we therefore have the anomaly *N. alba* var. *rubra*.

In some cases, different names are employed for the same signification. Thus, the fact that a plant hails from China may be expressed in one case as *Brassica chinensis*, in others as *Rhododendron sinense*, *Rosa cathayensis*, *Begonia cathayana*, *Crinum asiaticum* var. *sinicum*. The name must hold as originally written, for

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the author has the right to adopt the word of his preference. If the author desires to bestow a name to suggest red-leaved, he has access to the Latin derivation *rubrifolius* or to the Greek derivation *erythrophyllus*.

Although most of the names here entered are descriptive adjectives, some of them are indicative of the region in which the plant first was found, as *virginiana*, *virginicus*, *virginiensis*, Virginian. As the significance of the geographical word is usually evident, these names are not fully entered here; thus there is no necessity to explain *americanus* or *europæus*. In some cases, however, the meaning may not be at first evident, as when the word is derived from the Latin name of the country, as *anglicus* for England, *lusitanicus* (Lusitanian) for Portugal.

It should be said that a geographical specific name may not indicate the natural range of a species. A plant may have been discovered in Japan and named *japonica* (or *nipponica*) and may subsequently be found to be native also in China and other countries; but the first name holds, even though, as in a few examples, it was applied erroneously. Linnæus supposed the rose-of-Sharon to be native to Syria and named it *Hibiscus syriacus*, but it is probably native only in eastern Asia.

Personal specific names and those likely to occur but once are explained in the text where they are found. Species-names derived from persons may be in the genitive or in the form of an adjective; as *Pandanus Veitchii*, Veitch's pandanus, *Calathea Veitchiana*, Veitchian calathea. If named for a woman, the termination is feminine, as *Lilium Sargentiae*, if written in the genitive. Substantive names in apposition hold their own termination, and the word in such cases is here printed with a capital letter to show its non-conformity and to add character to the treatment, if it is a proper name or an old generic name, as *Achillea Millefolium*, *Zea Mays*, *Salvia Horminum*, *Nicotiana Tabacum*. Such words are usually old generic names or prominent vernacular substantives, and they record some historical connection of the plant.

In botanical practice, the species-name is made to agree with its genus in gender: thus the Latin adjective *albus* (white) takes the regular masculine termination in *Lupinus albus*, because *Lupinus* is masculine; the feminine termination in *Rosa alba*; the neuter in *Sedum album*; in *Quercus* it is feminine (*Q. alba*), because most trees are feminine whatever the termination of the name. Thus *niger* (black) retains the masculine form in *Helleborus niger*, becomes feminine in *Betula nigra*, neuter in *Solanum nigrum*. In the following list, for convenience most of the

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adjectives are printed in the masculine form. The leading exceptions are those that terminate in *-fer* and *-ger*, meaning "bearing," these being given the feminine form.

The division of the word in the specific name-list is intended to indicate the accented or emphasized syllable and the length of its vowel, as commonly practised by botanists in English. Thus, **poet-icus** places the main stress on *et*, and the *e* is short, being followed by a consonant; **signa-tus** shows the emphasis on *na*, and the *a* is long, terminating a syllable. Similar practice is followed with the names of genera in the text: *Gossyp-ium* indicates that the stress is on *yp* with the *y* short; *Hyoscy-amus* that the stress is on *cy* with the *y* long. Practice differs in the pronunciation of personal names in the genitive; some persons prefer to render them essentially as the original name is pronounced, as *Hook-eri*, with accent on *ook*; others follow certain precedents and say *Hooker-i*, with the stress on *er*. In this book no attempt is made to indicate a division in these names. The divisions of the various words in this list may not follow accepted syllabification; they are intended only to aid in pronunciation.

The significance of many specific names is self-evident, and these words need not be entered here. Some of these cases are indicated in the following paragraphs.

Prefixes indicating number: (1) In Latin words, **uni-**, as **uniflorus**, 1-flowered; **bi-**, as **bipinna-tus**, twice-pinnate, **bij-ugus**, 2-yoked or -paired; **tri-**, as **trifolia-tus**, 3-leaved; **quadri-**, as **quadrifidus**, 4-cut or -divided; **quinque-**, as **quinquefo-lius**, 5-leaved; **quinelocula-ris**, 5-loculed or -celled; **sex-**, as **sexangula-ris**, 6-angled or -cornered; **septem-**, as **septem-lobus**, 7-lobed; **octo-**, as **octosep-alus**, 8-sepalled; **deca-**, **decem-**, as **decapet-alus**, 10-petaled, **decemlinea-tus**, 10-lined; **multi-**, many, as **multiflorus**, many-flowered. (2) In Greek compounds, **mono-**, as **monocarp-us**, 1-carped; **di-**, as **did-ymus**, twin; **tri-**, as **tript-eris**, 3-winged; **tetra-**, as **tetracan-thus**, 4-spined; **penta-**, as **pentag-ynus**, 5-pistilled; **hex-**, as **hexag-onus**, 6-cornered; **hepta-**, as **heptaneu-rus**, 7-nerved; **octo-**, as **octophyl-lus**, 8-leaved; **deca-**, as **decan-dra**, 10-stamened; **poly-**, many, as **polyphyl-lus**, many-leaved.

Prefixes denoting size: (1) In Latin, **grandi-**, (*grandis*) large, as **grandidenta-tus**, large-toothed, **grand-iceps**, large-headed; **parvi-**, small, as **parviflorus**, small-flowered; **lati-**, broad, as **latifo-lius**, broad-leaved; **angusti-**, narrow, as **angustifo-lius**, narrow-leaved; **longi-**, long, as **longicauda-tus**, long-tailed; **brevi-**, short, as **brevicaulis**, short-stemmed. (2) In Greek combinations, **macro-**, **mega-**, large, as **macroceph-alus**, large-headed, **megasperm-us**,

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large-seeded; **micro-**, small, as **microl-epis**, small-scaled; **platy-**, broad, as **platys-tachys**, broad-spiked; **steno-**, narrow, as **stenogynus**, with narrow stigma; **brachy-**, short, as **brachyb-otrys**, short-clustered.

Generic prefixes, of indefinite number: **adiantifo-lius**, Adiantum-leaved; **adiantiform-e**, Adiantum-formed or -like; **dolichocarpus**, Dolichos-fruited; **gloxinæflo-rus**, Gloxinia-flowered.

Terminals: (1) **-ensis**, citizen or inhabitant of, as **canaden-sis**, of Canada, **monspeliën-sis**, of Montpelier. (2), **-oides**, **-oidea**, (**-odes**), like, as **agavoi-des**, Agave-like, **cerastioi-des**, Cerastium-like, **rhomboid-ea**, rhomb-like. (3) **-inus**, like, as **rubelli-nus**, like the species *rubellus*.

Self-explanatory combinations: **albomacula-ta**, white-spotted; **aureostria-ta**, golden-striped; **viridiglaucous-cens**, glaucous-green; **rubrofruc-ta**, red-fruited; **roseopic-ta**, rose-painted; **flavov-irens**, yellowish-green.

**Abortive**. Defective; barren; not developed.

**Abrupt**. Changing suddenly rather than gradually, as a leaf that is narrowed quickly to a point, not tapering; also pinnate leaf that has no terminal leaflet.

**abyssin-icus**: Abyssinian.

**Acaulescent**. Stemless, or apparently stemless; sometimes the stem is subterranean or protrudes only slightly; descriptive rather than morphological term.

**acau-lis**: stemless; acaulescent.

**Acephalous**. Headless.

**Achene** (*akme*). A dry indehiscent one-seeded pericarp.

**ac-idus**: acid, sour.

**a-cris**: acrid, sharp.

**aculea-tus**: prickly.

**acumina-tus**: acuminate, long-pointed, tapering.

**Acute**. Sharp; ending in a point.

**acutifo-lius**: acutely leaved, sharp-leaved.

**adenoph-orus**: gland-bearing.

**Adnate**. Grown to, organically united with another part; as stamens with the corolla-tube, or an anther in its whole length with the filament.

**Adventitious**. Stranger; introduced but not yet naturalized or established.

**Adventitious buds**. Buds appearing on occasion, rather than resident in regular places and order, as those arising about wounds.

**Æstivation**. The arrangement of floral envelopes in the bud (*æstivus*, *summer*, when flowers mostly appear. Vernation is leaf-arrangement in the bud).

**æsti-vus**: summer; **æstiva-lis**, pertaining to summer.

**æthiop-icus**: Ethiopian, African.

**affi-nis**: related (to another species).

**Aggregate fruit**. One formed by the coherence of pistils that were distinct in the flower, as blackberry.

**ala-tus**: winged.

**al-bidus**: white.

**albiflo-rus**: white-flowered.

**al-bulus**: whitish.

**Albumen**. Starchy or other nutritive material accompanying the embryo; commonly used in the sense of endosperm, for the material surrounding the embryo.

**al-bus**: white.

**alcicor-nis**: elk-horned.

**alexandri-nus**: of Alexandria (Egypt).

**allia-ceus**: of the alliums, garlic-like, usually connoting odor.

**alpes-tris**: nearly alpine.

**alpi-nus**: alpine; growing on mountains above the tree line.

**Alternate**. Any arrangement of leaves or other parts not opposite or whorled; placed singly at different heights on the axis or stem.

**alternifo-lius**: alternate-leaved.

**altis-simus**: very tall, tallest.

**al-tus**: tall.

**alum-nus**: well nourished, flourishing.

**amab-ilis**: lovely.

**ama-rus**: bitter.

**amazon-icus**: of the River Amazon region.

**ambig-uus**: ambiguous, doubtful.

**ambly-odon**: blunt-toothed.

**Ament**. Catkin.

**amethys-tinus**: amethystine, violet-colored.

**amœ-nus**: charming, pleasing.

**amplexicaul-lis**: stem-clasping.

**amuren-sis**: of the Amur River region.

**Anastomosing**. Netted; interveined; said of leaves marked by cross-veins forming a network.

**an-ceps**: two-edged, two-headed.

# TERMS AND NAMES

*Ander.* Male; occurs in combinations, as *monandrous*, having one stamen.  
*angula-ris, angula-tus*: angular, angled.  
*anisa-tum*: anise-scented.  
*Annual.* Of one season's duration from seed to maturity and death.  
*anom-alus*: anomalous, out of the ordinary or usual.  
*antarcticus*: of the Antarctic regions.  
*Anterior.* Front; on the front side; away from the axis; toward the subtending bract.  
*Anther.* The pollen-bearing part of the stamen, borne at the top of the filament or sometimes sessile.  
*Antheridium.* In Cryptogams the organ corresponding to an anther or male organs in flowering plants.  
*Antheriferous.* Anther-bearing.  
*Anthesis.* Flowering; strictly, the time of expansion of a flower, but often used to designate the flowering period; the act of flowering.  
*antiquo-rum*: of the ancients.  
*Apetalous.* No petals; petals missing.  
*apicula-tus*: apiculate, tipped with a point.  
*Apocarpous.* Carpels separate; not united; see *Syncarpous*.  
*Appendage.* An attached subsidiary or secondary part, as a projecting part or a hanging part or supplement.  
*Appressed.* Closely and flatly pressed against; adpressed.  
*aquat-icus, aquat-ilis*: aquatic.  
*arab-icus*: Arabian.  
*Arachnoid.* Cobwebby by soft and slender entangled hairs; also spider-like.  
*arbores-cens*: becoming tree-like, or nearly the size of a tree.  
*arbo-reus*: tree-like, pertaining to a tree.  
*Archegonium.* In higher Cryptogams the organ corresponding to a pistil or female organs in flowering plants.  
*arc-ticus*: arctic; of the Arctic regions.  
*arena-rius*: of sand or sandy places.  
*argen-teus*: silvery; *argenteo-gutta-tus*: silver-spotted.  
*argilla-ceus*: of clay, growing in clay, clay-colored.  
*argophyl-lus*: silver-leaved.  
*argu-tus*: sharp-toothed.  
*argyroneu-tus*: with silver-colored nerves or veins.  
*arieti-nus*: like a ram's head.  
*Aril.* An appendage or an outer covering of a seed, growing out from the hilum or funiculus; sometimes it appears as a pulpy covering.  
*arista-tus*: aristate, bearded.  
*arma-tus*: armed (as with thorns).  
*Armed.* Provided with any kind of strong and sharp defence, as of thorns, spines, prickles, barbs.  
*armilla-ris*: with a bracelet, arm-ring, or collar.  
*aromat-icus*: aromatic.  
*Articulate.* Jointed; provided with nodes or joints, or places where separation may naturally take place.

*arundina-ceus*: reed-like.  
*arven-sis*: pertaining to cultivated fields.  
*Ascending.* Rising up; produced somewhat obliquely or indirectly upward.  
*Asexual.* Sexless; without sex.  
*as-per*: rough, as with hairs or points.  
*assim-ilis*: similar or like.  
*Assurgent.* Ascending, rising.  
*atlant-icus*: Atlantic, growing in Atlantic regions.  
*atropurpu-reus*: dark purple.  
*atror-ubens*: dark red.  
*atrosanguin-eus*: dark blood-red.  
*atrov-irens*: dark green.  
*august-us*: august, notable, majestic.  
*auranti-acus*: orange-colored.  
*au-reus, aura-tus*: golden.  
*Auricle.* An ear-shaped part or appendage, as the projections at the base of some leaves and petals.  
*auric-omus*: golden-haired.  
*austra-lis*: southern.  
*austri-acus*: Austrian.  
*autumna-lis*: autumnal, of autumn.  
*a-vium*: of the birds.  
*Awl-shaped.* Narrow and sharp-pointed; gradually tapering from base to a slender or stiff point.  
*Awn.* A bristle-like part or appendage.  
*Azil.* Upper angle that a petiole or peduncle makes with the stem that bears it.  
*axilla-ris*: axillary, borne in the axils, pertaining to the axils.  
*Axillary.* In an axil.  
*Axis.* The main or central line of development of any plant or organ; the main stem.  
*azu-reus*: azure, sky-blue.  
*Baccate.* Berry-like; pulpy or fleshy.  
*balsamif-era*: balsam-bearing.  
*barba-tus*: barbed, bearded.  
*barbino-de*: bearded at nodes.  
*Basifixed.* Attached or fixed by the base, as an ovule that is affixed to its support by its bottom rather than by its side.  
*Beak.* A long prominent and substantial point; applied particularly to prolongations of fruits and carpels.  
*Beard.* A long awn or bristle-like hair.  
*bel-lus*: handsome.  
*benedic-tus*: blessed.  
*benghalen-sis*: of Bengal (E. India).  
*berolinen-sis*: of Berlin.  
*Berry.* Pulpy, indehiscent, few- or many-seeded fruit; technically, the pulpy fruit resulting from a single pistil, containing one or more seeds but no true stone, as the tomato.  
*beta-ceus*: of the beet, beet-like.  
*Biennial.* Of two seasons' duration from seed to maturity and death.  
*bistor-tus*: twice twisted; also an old substantive, the bistort, one of the Polygonums.  
*Bladdery.* Inflated; empty, and the walls thin like the bladder of an animal.  
*Blade.* The expanded part of leaf or petal.  
*blan-dus*: bland, mild, pleasant.  
*bolivien-sis*: of Bolivia.



# TERMS AND NAMES

**borea-lis:** northern.

**Bo-trys:** cluster, as of grapes; sometimes used as equivalent to raceme.

**Bract.** A much-reduced leaf, particularly the small or scale-like leaves in a flower-cluster or associated with the flowers.

**bractea-tus:** bracteate, bearing bracts.

**Bractlet.** Bract borne on a secondary axis, as on the pedicel or even on a petiole.

**brasilien-sis:** of Brazil.

**Bristly.** Bearing stiff strong hairs or bristles.

**Bulb.** A thickened part in a resting state and made up of scales or plates on a much shortened axis.

**Bulbel.** Bulbs arising around the mother bulb.

**bulbif-era:** bulb-bearing.

**Bulblet.** Little bulbs produced in the leaf axils, inflorescence or other unusual areas.

**bulbo-sus:** bulbous.

**Bullate.** The surface blistered or puckered, as the leaf of a Savoy cabbage.

**Bush.** A low and thick shrub, without distinct trunk.

**cachemir-icus:** same as *cashmerianus*.

**Caducous.** Falling off early, or prematurely, as the sepals in some plants.

**cæru-leus:** cerulean, sky-blue, dark blue.

**cæ-sius:** bluish-gray.

**caf-fer, caf-fra:** Kafir (in S. Africa).

**calathi-nus:** basket-like.

**Calcarate.** Spurred.

**calendula-ceus:** Calendula-like, with reference to color of flowers.

**Callus.** A hard prominence or protuberance; in a cutting or on a severed or injured part, the roll of new covering tissue.

**calyci-nus, calyco-sus:** calyx-like.

**Calyculate.** Calyx-like; bearing a part resembling a calyx; particularly, furnished with bracts against or underneath the calyx resembling a supplementary or outer calyx.

**Calyptra.** A hood or lid; particularly the hood or cap of the capsule of a moss or lid in fruit of eucalyptus.

**Calyx.** The outer circle of floral envelopes.

**campanula-ria:** bell-flowered.

**Campanulate.** Bell-shaped.

**campes-tris:** of the fields or plains.

**campschat-icus:** of Kamtschatka.

**canarien-sis:** of the Canary Islands.

**can-dicans:** white, hoary, particularly white-hairy or white-woolly.

**can-didus:** pure white, white-hairy, shining.

**Canescent.** Gray-pubescent and hoary, or becoming so.

**cani-nus:** canine, pertaining to a dog.

**cannabi-nus:** like Cannabis or hemp.

**cantab-ricus:** Cantabrian, of Cantabria (N. of Spain).

**cantonien-sis:** of Canton (in S. China).

**Cap.** A convex removable covering of a part, as of a capsule; in the grape, the cohering petals fall off as a cap.

**capen-sis:** of the Cape (of Good Hope).

**Capillary.** Hair-like; very slender.

**Capitate.** Headed; in heads; formed like a head; aggregated into a very dense or compact cluster.

**Capsular.** Pertaining to a capsule; formed like a capsule.

**Capsule.** Compound pod; a dry fruit of more than one carpel, usually opening at maturity.

**cardina-lis:** cardinal.

**cardiopet-alus:** petals heart-shaped.

**Carinate.** Keeled; provided with a projecting central longitudinal line or ridge on the lower or under surface.

**car-neus:** flesh-colored.

**carno-sus:** fleshy.

**carolinia-nus, caroli-nus:** Carolinian, pertaining to North or South Carolina, or indefinitely to the Carolinas.

**carpath-icus, carpat-icus:** of the Carpathian region (Europe).

**Carpel.** One of the foliar units of a compound pistil; a simple pistil has one carpel.

**caryotid-eus:** Caryota-like.

**cashmeria-nus:** of Cashmere (Asia).

**cathar-ticus:** cathartic.

**Catkin.** A scaly-bracted spike with declinuous flowers; ament; prominent in willows and poplars.

**caucas-icus:** belonging to the Caucasus (mountain region between the Black and Caspian Seas).

**cauda-tus:** caudate, tailed.

**Caulescent.** More or less stemmed or stem-bearing; having an evident stem above ground.

**Cauline.** Pertaining or belonging to the stem.

**cayennen-sis:** of Cayenne (French Guiana).

**centifo-lius:** hundred-leaved, in the sense of very many-leaved.

**cephalon-icus:** of Cephalonia (one of the Ionian islands).

**cerasif-era:** Cerasus- or cherry-bearing.

**cerea-le:** pertaining to Ceres or agriculture.

**Cernuous.** Drooping; inclining somewhat from the perpendicular.

**Cespitose, cæspitose.** Matted; growing in tufts; in little dense clumps; said of low plants that make tufts or turf of their basal growths.

**Chaff.** A small, thin, dry and membranous scale or bract; in particular, the bracts in the flower-heads of composites.

**chalcon-icus:** of Chalcedon (on the Bosphorus).

**chalepen-sis, halepen-sis:** of Aleppo, in S. W. Asia.

**Chamæ-drys, chamædrifo-lius:** ante-Linnæan name, meaning *dwarf oak*, in allusion to shape of leaves of certain plants to which it was applied.

**chilen-sis, chiloen-sis:** belonging to Chile.

**chloran-thus:** green-flowered.

**Chrys-.** In Greek compounds, signifying *golden* or *golden yellow*; as **chrysanthus:** golden-flowered; **chrysolo-bus:** golden-lobed.

**cicuta-rius:** of or like Cicuta.



## TERMS AND NAMES

**Ciliate.** Fringed with hairs; bearing hairs on the margin.  
**cilic-icus:** of Cilicia (in S. E. Asia Minor).  
**Cinereous.** Ash-colored; light gray.  
**cinnabari-nus:** cinnabar-red.  
**cinnamo-meus:** cinnamon-brown.  
**circina-tus, circina-lis:** circinate, coiled.  
**Circumscissile.** Opening or dehiscing by a line around the fruit or anther, the valve usually coming off as a lid.  
**cirrho-sus:** tendrilled.  
**citra-tus:** citrus-like.  
**Clasping.** Leaf partly or wholly surrounding stem.  
**Clavate.** Club-shaped; said of a long body thickened toward the top.  
**Claw.** The long narrow petiole-like base of the petals or sepals in some flowers.  
**Cleistogamous flowers.** Small closed self-fertilized flowers, as in some violets and in many other plants; they are mostly on or under the ground.  
**coccin-eus:** scarlet.  
**Coccus.** A berry (plural *cocci*); in particular, one of the parts of a lobed fruit with one-seeded cells.  
**celesti-nus:** sky-blue.  
**cœles-tis:** celestial, sky-blue.  
**Coherent.** Two or more similar parts or organs joined.  
**col-chicus:** of Colchis (eastern Black Sea region).  
**Column.** Body formed of union of stamens and pistil in orchids, or of stamens, as in mallows.  
**columnella-nus:** pertaining to a small pillar or pedestal.  
**co-mans:** furnished as with hair, or hair-like.  
**Commissure.** The place of joining or meeting; as the face by which one carpel joins another.  
**commu-nis:** growing in common or community, gregarious; sometimes taken in the sense of "common."  
**Comose.** Bearing a tuft or tufts of hair.  
**compact-tus:** compact, dense.  
**complex-us:** encircled, embraced.  
**Composite.** Compound; said of an apparently simple or homogeneous organ or structure made up of several really distinct parts.  
**Compound.** Of two or more similar parts in one organ.  
**Compound leaf.** A leaf with two or more separate leaflets; in some cases (as in Citrus) some of the leaflets may be obsolete and the compound leaf have only one leaflet.  
**Compound pistil.** Of two or more carpels united.  
**Compressed.** Flattened, especially flattened laterally.  
**concin-nus:** neat, well made, elegant.  
**con-color:** colored similarly.  
**Conduplicate.** Two parts folded together lengthwise.  
**Cone.** A dense and usually elongated collection of flowers or fruits that are borne beneath scales, the whole with scales and axis forming a detachable homogeneous

fruit-like body, some cones are of short duration, as the staminate cones of pines, and others become dry and woody durable parts.  
**confer-tus:** crowded.  
**conges-tus:** congested, brought together.  
**Connate.** United or joined; in particular, like or similar structures joined as one body or organ.  
**Connective.** The filament or tissue connecting the two cells of an anther, particularly when the cells are separated.  
**Connivent.** Coming together or converging, but not organically connected.  
**conspic-uus:** conspicuous, marked, visible.  
**Convolute.** Said of floral envelopes in the bud when one edge overlaps the next part or petal or sepal or lobe while the other edge or margin is overlapped by a preceding part; rolled up.  
**coræen-sis:** of Korea.  
**Cordate.** Heart-shaped; with a sinus and rounded lobes at the base and ovate in general outline.  
**cordifo-lius:** cordate-leaved, heart-leaved;  
**cordifor-mis,** heart-form.  
**Corm.** A solid bulb-like part, usually subterranean, as the "bulb" of crocus and gladiolus.  
**Cormel.** A corm arising from a mother-corm.  
**Corniculate.** Bearing or terminating in a small horn-like protuberance or process.  
**cornig-era:** horn-bearing.  
**cornu-tus:** horned.  
**Corolla.** Inner circle of floral envelopes; if the parts are separate, they are petals; if not separate, they are teeth, lobes or divisions.  
**corolla-tus:** corollate, corolla-like.  
**Corona.** Crown, coronet; any appendage or intrusion that stands between the corolla and stamens, or on the corolla, as the cup of a daffodil, or that is the outgrowth of the staminal part or circle, as in the milkweeds.  
**corona-rius:** used for or belonging to garlands.  
**corona-tus:** crowned.  
**Corymb.** Short and broad, more or less flat-topped indeterminate flower-cluster; outer flowers opening first.  
**corymbo-sus:** corymbose.  
**corynoc-alyx:** club-like calyx.  
**costa-tus:** costate, ribbed.  
**Cotyledon.** Seed-leaf; the primary leaf or leaves in the embryo; in some plants the cotyledon always remains in the seed-coats and in others (as bean) it emerges on germination.  
**crassifo-lius:** thick-leaved.  
**cras-sipes:** thick-footed or -stalked.  
**cre-brus:** close, frequent, repeated.  
**Crepper.** A trailing shoot that takes root mostly throughout its length; sometimes applied to a tight-clinging vine.  
**Crenate.** Shallowly round-toothed or obtusely toothed, scalloped.  
**crenula-tus:** crenulate, somewhat scalloped.  
**Crested.** With elevated and irregular or toothed ridge.

## TERMS AND NAMES

**cret-icus:** of Crete (island in eastern Mediterranean).

**crini-tus:** provided with long hair.

**cris-pus:** crisped, curled.

**Cristagal-li:** cockscomb.

**crista-tus:** cristate, crested.

**cro-ceus:** saffron-colored, yellow.

**Crown.** Corona; also that part of the stem at the surface of the ground; also a part of a rhizome with a large bud, suitable for use in propagation.

**crucia-tus:** cruciate, cross-like.

**cruen-tus:** bloody.

**Crusgal-li:** cockspur.

**crystal-linus:** crystalline.

**Cultigen.** Plant or group known only in cultivation; presumably originating under domestication; contrast with indigen.

**Cultivar.** A variety or race that has originated and persisted under cultivation, not necessarily referable to a botanical species.

**culto-rum:** of the cultivators (of plants).

**cultifor-mis:** shaped like broad knife-blade.

**Cuneate.** Wedge-shaped; triangular, with the narrow end at point of attachment, as of leaves or petals.

**cuneifo-lius:** wedge-leaved.

**cus-preus:** copper-like or -colored.

**cuspidatus:** cuspidate, with a cusp or sharp stiff point.

**cyanan-thus:** blue-flowered.

**cyanophyl-lus:** blue-leaved.

**cylin-dricus:** cylindrical.

**Cyme.** A broad, more or less flat-topped determinate flower-cluster; with central flowers opening first.

**dactylif-era:** finger-bearing.

**dahu-ricus, dau-ricus, dau-ricus:** Of Dahuria or Dauria (in Trans-Baikal Siberia, near the frontier of China).

**damasce-nus:** of Damascus.

**dasycar-pus:** thick-fruited.

**dasyphyl-lus:** thick-leaved.

**dealba-tus:** whitened, white-washed.

**deb-ilis:** weak, frail.

**Deciduous.** Falling, as the leaves of non-evergreen trees.

**Decom-pound.** More than once compound.

**deco-rus:** elegant, comely, becoming.

**Decumbent.** Reclining or lying on the ground, but with the end ascending.

**Decurrent.** Running down the stem, as the leaf of mullein.

**Decussate.** Opposite leaves in four rows up and down the stem; alternating in pairs at right angles.

**Dehiscence.** The method or process of opening of a seed-pod or anther.

**delicio-sus:** delicious.

**Deltoid.** Triangular; delta-like.

**demis-sus:** low, weak.

**Dendron.** In Greek compounds, signifying a tree.

**densiflo-rus:** densely flowered.

**Dentate.** With sharp spreading rather coarse indentations or teeth.

**denticula-tus:** denticulate, slightly toothed.

**denuda-tus:** denuded, naked.

**Depressed.** More or less flattened endwise or from above; pressed down.

**Dichotomous.** Forked in pairs.

**Didynamous.** With four stamens in two pairs of different length.

**Diffuse.** Loosely branching or spreading; of open growth.

**Digitate.** Hand-like; compound with the members arising from one point, as the leaflets of horse-chestnut. Cf. *Palmate*.

**dilata-tus:** dilated, expanded, as a filament much broadened.

**Diæcious.** Staminate and pistillate flowers on different plants.

**dipsa-ceus:** of the teasel or Dipsacus.

**diptero-car-pus:** two-winged carpel or fruit.

**dis-color:** of two or of different colors.

**Disk, disc.** A more or less fleshy or elevated development of the receptacle about the pistil; receptacle in the head of Compositæ; a flattened extremity, as on tendrils of Virginia creeper.

**Disk-flowers.** The tubular flowers in the center of heads of Compositæ, as distinguished from the ray-flowers.

**Dissected.** Divided into many slender segments.

**dissitiflo-rus:** remotely or loosely flowered.

**dista-chyus:** two-spiked.

**dis-tichus:** two-ranked, with leaves or flowers in ranks on opposite sides of stem.

**Distinct.** Separate; not united with parts in the same series; compare *Fres*.

**diur-nus:** of the day, as day-flowering.

**divarica-tus:** divaricate, spreading, widely divergent.

**diversiflo-rus:** diversely flowered, variable-flowered.

**diversifo-lius:** variable-leaved.

**Divided.** Separated to the base.

**dolabra-tus, dolobra-tus:** mattock-shaped or hatchet-shaped.

**domes-ticus:** domestic, domesticated.

**Dorsal.** Back; relating to the back or outer surface of a part or organ.

**Dorsified.** Attached by the back.

**Double.** Said of flowers that have more than the usual or normal number of floral envelopes, particularly of petals; full.

**Downy.** Covered with very short and weak soft hairs.

**drepanophyl-lus:** leaves sickle-shaped.

**Drupe.** A fleshy one-seeded indehiscent fruit, with seed inclosed in a stony endocarp; stone-fruit.

**Drupelet.** One drupe in a fruit made up of aggregate drupes, as in the raspberry.

**dul-cis:** sweet.

**durac-inus:** hard-berried.

**durius-culus:** somewhat hard or rough.

**E- or Ex-.** In Latin-formed words, usually denoting, as a prefix, that parts are missing, as *exstipulate*, *without stipules*, *estriate*, *without stripes*.

**edu-lis:** edible.

**effu-sus:** very loose-spreading.

# TERMS AND NAMES

**elas-ticus:** elastic.  
**ela-tior, ela-tius:** taller.  
**ela-tus:** tall.  
**el-egans:** elegant.  
**elegantis-simus:** most elegant, very elegant.  
**Elliptic.** A flat part or body that is oval and narrowed to rounded ends.  
**Elongate.** Lengthened; stretched out.  
**Emarginate.** With a shallow notch at the apex.  
**Embryo.** The plantlet in the seed.  
**ensa-tus:** sword-shaped.  
**ensifo-lius:** sword-leaved.  
**ensifor-mis:** sword-formed or -shaped.  
**Entire.** Margin continuous, not in any way indented; whole.  
**Ephemeral.** Persisting for one day only, as flowers of spiderwort.  
**Epi-.** A Greek prefix signifying *on* or *upon*.  
**Epigynous.** Borne on the ovary; used of floral parts when ovary is inferior and flower not perigynous.  
**Epiphyte.** Air-plant; a plant growing on another or on some other elevated support.  
**erect-tus:** erect, upright.  
**ericoi-des:** Erica-like, heath-like.  
**eriocar-pus:** woolly-fruited.  
**ero-sus:** erose, jagged, as if gnawed.  
**erubes-cens:** blushing.  
**erythro-pus:** red-footed or -stalked.  
**erythroso-rus:** red sori.  
**esculen-tus:** esculent, edible.  
**Evergreen.** Remaining green in its dormant season; sometimes applied to plants that are green throughout the year.  
**ever-ta:** expelled, turned out.  
**exalta-tus:** exalted, very tall.  
**excel-sus:** tall; excel-sior, taller.  
**exim-ius:** distinguished, out of the ordinary, excelling.  
**exot-icus:** exotic, from another country.  
**expan-sus:** expanded.  
**Exserted.** Sticking out; projecting beyond, as stamens from a perianth; not included.  
**Exstipulate.** Without stipules.  
**Extrorse.** Looking or facing outward.  
**Eye.** The marked center of a flower; a bud on a tuber, as on a potato; a single-bud cutting.  
**falca-tus:** falcate, sickle-shaped or scythe-shaped.  
**fal-lax:** deceptive.  
**Farinaceous.** Containing starch, or starch-like materials.  
**Fasciated.** Much flattened; an abnormal or teratological widening and flattening of the stem.  
**Fascicle.** A condensed or close cluster, as of flowers.  
**fascicula-tus:** fascicled.  
**fastigia-tus:** fastigate, branches erect and close together.  
**fastuo-sus:** proud.  
**fat-uus:** foolish, simple; may be used in the sense of insipid.  
**Feminine.** Pistillate (in higher plants).  
**fenestra-lis:** with window-like openings.  
**ferrugin-eus:** rusty, of the color of iron rust.

**Fertile.** Said of pollen-bearing stamens and seed-bearing fruits.  
**Fetid.** Having a disagreeable odor.  
**ficoi-des:** Ficus- or fig-like; **ficifo-lia:** Ficus-leaved.  
**Filament.** Thread, particularly the stalk of the anther.  
**filamento-sus:** filamentous, composed of threads or bearing threads.  
**filicifo-lius:** fern-leaved.  
**filif-era:** bearing filaments or threads.  
**Filiform.** Thread-like; long and very slender.  
**filipenduli-nus:** like *Filipendula*.  
**Fimbriate.** Fringed.  
**fir-mus:** firm, strong.  
**fistulo-sus:** fistular, hollow-cylindrical.  
**flabella-tus:** flabellate, with fan-like parts.  
**flac-cidus:** flaccid, soft.  
**flagellifor-mis:** whip-formed.  
**flam-meus:** flame-colored.  
**flaves-cens:** yellowish, becoming yellow or yellowish.  
**fla-vus:** yellow.  
**Flexuous.** Having a more or less zigzag or wavy form; said of stems of various kinds.  
**florenti-nus:** Florentine.  
**floreple-no:** with full or double flowers.  
**Florets.** Individual flowers of composites and grasses; also other very small flowers that make up a very dense form of inflorescence.  
**floribun-dus:** free-flowering, blooming profusely.  
**flor-idus:** flowering, full of flowers.  
**Floriferous.** Flower-bearing.  
**—florus:** in descriptive botany used to indicate flower, as **albiflo-rus**, white-flowered, **multiflo-rus**, many-flowered. The name *Flora*, in Latin the goddess of the flowering of plants, is used to designate either the plants of a region taken together, as "the flora of Canada," or a treatise describing the plants.  
**fluminen-sis:** of a river.  
**fœt-idus:** fetid, bad-smelling.  
**Foliaceous.** Leaf-like; said particularly of sepals and calyx-lobes and of bracts that in texture, size or color look like small or large leaves.  
**folio-sus:** leafy, full of leaves.  
**—folius:** folium is Latin for *leaf*; **rotundifolius**, round-leaved; **ulmifo-lius**, *Ulmus*-leaved (elm-leaved); **unifolia-tus**, one-leaved.  
**—foliolatus**, refers to leaflets, as **trifoliola-tus**, with three leaflets.  
**Follicle.** Dry dehiscent pericarp opening only on the front suture.  
**formosis-simus:** most or very beautiful.  
**formo-sus:** beautiful, handsome.  
**foveola-tus:** pitted, with small depressions.  
**frag-ilis:** fragile, brittle.  
**fra-grans:** fragrant, odorous.  
**fragrantis-simus:** very fragrant.  
**Free.** Not joined to other organs; as petals free from the stamens or calyx or the veinlets (as in ferns) not united. Sometimes, however, the word is used in the sense of *distinct*.  
**frig-idus:** cold, of cold regions.

# TERMS AND NAMES

*Fron'd.* Leaf of fern; sometimes used in the sense of foliage.

*Fruit.* The ripened pericarp or pericarps with the adnate parts; the seed-bearing organ.

*frumenta-ceus:* pertaining to grain (or corn).

*frutes-cens:* shrubby, bushy.

*fru-tex:* a shrub or bush.

*fru-ticans:* shrubby, shrub-like.

*Fruticose.* Shrubby or shrub-like in the sense of being woody.

*Fugacious.* Falling or withering away very early.

*ful-gens:* shining, glistening.

*ful-gidus:* fulgid, shining.

*ful-vus:* fulvous, tawny, orange-gray-yellow.

*fu-nebris:* funereal.

*fungo-sus:* fungous, pertaining to a fungus, spongy.

*Funnelform.* With tube gradually widening upward and passing insensibly into the limb, as in many flowers of *Convolvulus*; infundibuliform.

*furca-tus:* furcate, forked.

*Furrowed.* With longitudinal channels or grooves.

*fus-cus:* fuscous, brown, dusky.

*Fusiform.* Spindle-shaped; narrowed both ways from a swollen middle, as dahlia roots.

*gal-licus:* of Gaul or France; also pertaining to a cock or rooster.

*Gamopetalous.* Corolla of one piece; petals united.

*gandaven-sis:* belonging to Ghent, Belgium.

*ganget-icus:* of the Ganges.

*genera-lis:* general, prevailing.

*geneven-sis:* belonging to Geneva (Switzerland).

*gibbiflo-rus:* gibbous-flowered.

*gibbo-sus:* swollen on one side.

*gib-bus:* gibbous, swollen on one side.

*gibraltar-icus:* of Gibraltar.

*gigante-us:* gigantic, very large.

*gigan-thes:* giant-flowered.

*glabel-lus:* smoothish.

*gla-ber:* glabrous, smooth.

*Glabrate.* Nearly glabrous, or becoming glabrous with maturity or age.

*Glabrous.* Not hairy; incorrectly used in the sense of *smooth* (which see).

*glacia-lis:* icy, frozen.

*gladia-tus:* sword-like.

*Gland.* Properly a secreting part or prominence or appendage, but often used in the sense of gland-like.

*Glandular.* Having or bearing secreting organs, or glands.

*glandulo-sus:* glandular, full of glands, very glandular.

*glaucous-cens:* glaucescent, becoming glaucous.

*glaucophyl-lus:* glaucous-leaved.

*Glaucous.* Covered with a "bloom" or a whitish substance that rubs off.

*globo-sus:* globose, spherical, nearly or quite globular.

*Glomerate.* In dense or compact cluster or clusters.

*glorio-sus:* glorious, superb.

*Glume.* A small chaff-like bract; in particular, one of the two empty bracts at the base of the grass spikelet.

*glutino-sus:* glutinous, gluey, sticky.

*grac-ilis:* graceful, slender.

*gracil-limus:* graceful, very slender.

*græ-cus:* of Greece, Greek.

*gramin-eus:* grassy, grass-like.

*graminifo-lius:* grass-leaved.

*Granular, granulose.* Covered with very small grains; minutely or finely mealy.

*gratis-simus:* very pleasing or agreeable.

*grave-olens:* heavy-scented.

*gutta-tus:* spotted or speckled.

*Gymnos.* In Greek compounds, signifying *naked* or *not covered*: as *gymnosperms*, with *naked seeds* (not in a pericarp); *gymnocarpus*: *naked-fruited*.

*Gynophore.* Stipe of an ovary prolonged within the calyx.

*halepen-sis, chalepen-sis:* of Aleppo, ancient region east of the Mediterranean.

*haloph-ilus:* salt-loving.

*Hastate.* Of the shape of an arrow-head but the basal lobes pointed or narrow and standing nearly or quite at right angles; halberd-shaped.

*Head.* A short dense spike; capitulum.

*Heart-shaped.* Cordate; ovate in general outline but with two rounded basal lobes; has reference particularly to the shape of the base of a leaf or other expanded part.

*hedera-ceus:* of the ivy (*Hedera*).

*Hemi-.* In Greek compounds, signifying *half*.

*Herb.* Plant naturally dying to the ground; without persistent stem above ground; lacking definite woody firm structure.

*Herbaceous.* Not woody; dying down each year; said also of soft branches before they become woody.

*hespe-rius:* of the West.

*Hetero-.* In Greek composition, signifying *various*, or of *more than one kind* or *form*; as *heterophyllous*, with *more than one kind* or *form* of leaf.

*Heterogamous.* With two or more kinds or forms of flowers.

*heterophyl-lus:* various-leaved, with leaves of more than one shape.

*hiber-nicus:* of Ireland.

*Hilum.* In the seed, the scar or mark indicating the point of attachment.

*himala-icus:* Himalayan.

*Hirsute.* With rather rough or coarse hairs.

*Hirtellous.* Softly or minutely hirsute or hairy.

*hispan-icus:* Spanish, of Spain.

*Hispid.* Provided with stiff or bristly hairs.

*Hispidulous.* Somewhat or minutely hispid.

*Hoary.* Covered with a close white or whitish pubescence.

*hollan-dicus:* of Holland.

*Homo-.* In Greek compounds, signifying *alike* or *very similar*.

*homol-epis:* homologous scales.

## TERMS AND NAMES

**horizontalis**: horizontal.

**hortensis**, **hortulanus**, **hortulanus**, **hortulanus**: belonging to a hortus or garden, or to gardens.

**humilis**: low-growing, dwarf.

**Hybrid**. A plant resulting from a cross between two or more parents that are more or less unlike.

**hymeleus**, **hiemaleis**: of winter.

**hymenosepalus**: sepals membranous.

**Hypanthium**. A fruit-like body (as the rose-hip) formed by the enlargement of the torus and bearing the proper fruits on its upper or inner surface; literally "beneath the flower." Now commonly used to denote the cup-shaped receptacle on which calyx, petals and stamens are inserted in cases of perigyny, as in plum, fuchsia.

**hypogæus**: underground, subterranean.

**Hypogynous**. Borne on the torus, or under the ovary; said of the stamens or petals.

**hypoleucus**: whitish, pale.

**ibericus**: of Iberia (the Spanish peninsula).

**ilicifolius**: ilex-leaved, holly-leaved.

**illustrius**: bright, brilliant, lustrous.

**imbricatus**: imbricated, overlapping, shingled.

**Imparipinnate**. Unequally pinnate; odd-pinnate; with a single terminal leaflet.

**imperialis**: imperial, kingly.

**incanus**: hoary.

**incarnatus**: flesh-colored.

**Incised**. Cut; slashed irregularly, more or less deeply and sharply.

**incisifolius**: cut-leaved.

**Included**. Not protruded, as stamens not projecting from the corolla; not exerted.

**incomparabilis**: incomparable, excelling.

**Indehiscent**. Not regularly opening, as a seed-pod or anther.

**indentatus**: indented, dented.

**indicus**: Indian, of India or the East Indies.

**Indigen**. Indigenous inhabitant; a native.

**Indumentum**. Hairy or pubescent with rather heavy covering.

**induratus**: hard, hardened.

**Indusium**. The little growth that covers or surrounds the sorus or fruit-dot in ferns.

**inermis**: unarmed, without thorns or spines.

**infectoriosus**: used for dying, pertaining to dyes.

**Inferior**. Beneath, lower, below; as an inferior ovary, one that is below the calyx-leaves.

**Inflated**. Blown up; bladder.

**Inflorescence**. Mode of flower-bearing; technically less correct but much more common in the sense of a flower-cluster.

**Infra**. In combinations, signifying below.

**inodorus**: without odor, scentless.

**inquinans**: polluting, discoloring.

**Inserted**. Attached; as a stamen growing on the corolla.

**insignis**: remarkable, distinguished, marked.

**insitivus**: grafted.

**insularis**: insular, belonging to an island.

**integer**: entire.

**integerimus**: very entire.

**integrifolius**: entire-leaved.

**Inter**. In composition, signifying between, particularly between closely related parts or organs.

**intermedius**: intermediate.

**Interrupted**. Not continuous; in particular, the interposition of small leaflets or segments between others.

**Introrse**. Turned or faced inward or toward the axis, as an anther looking toward the center of the flower.

**Inverted**. Turned over; end-for-end; top-side down.

**Involucrel**. A secondary involucre; small involucre about the parts of a cluster.

**involutus**: involucred, with an involucre.

**Involucre**. A whorl of small leaves or bracts standing close underneath a flower or flower-cluster.

**Involute**. Said of a flat body (as a leaf) rolled inward or toward the upper side. See *Revolute*.

**ionanthus**: violet-flowered.

**ioensis**: of Iowa.

**Irregular flower**. Some parts different from other parts in same series.

**isophyllus**: equal-leaved.

**izocarpus**: sticky- or glutinous-fruited.

**javanicus**: Javan, of Java.

**Jointed**. With nodes, or points of real or apparent articulation.

**juba**: crested, with a mane.

**junceus**: Juncus-like, rush-like.

**juniperinus**: Juniper-like.

**kamtschaticus**, **camptchaticus**, and other spellings: of Kamtschatka.

**Keel**. Ridged like the bottom of a boat; also the two front united petals of a papilionaceous flower.

**kewensis**: belonging to Kew (Royal Botanic Gardens, Kew, England).

**Labelum**. Lip, particularly the lip of orchids.

**Labiata**. Lipped; a member of the Labiata.

**Lacerate**. Torn; irregularly cleft or cut.

**Laciniate**. Slashed into narrow pointed lobes.

**laciniosus**: laciniose, laciniate.

**lactiflorus**: flowers milk-colored.

**lacustris**: pertaining to lakes.

**ladaniferus**: ladanum-bearing.

**lactiflorus**: bright- or pleasing-flowered.

**lævigatus**: smooth.

**lævis**: smooth.

**lagena**: of a bottle or flask.

**lanatus**: woolly.

**Lanceolate**. Lance-shaped; much longer than broad; widening above the base and tapering to the apex.

**lanuginosus**: woolly, downy.

**lasianthus**: woolly-flowered.

**Lateral**. On or at the side.

**lateritius**: brick-red.

**latifolius**: broad-leaved.

**latisquamus**: broad-scaled.

**laurinus**: laurel-like.



## TERMS AND NAMES

**Leaflet.** One part of a compound leaf; secondary leaf.

**Leaf-stalk.** The stem of a leaf; petiole; foot-stalk.

**Legume.** Simple pericarp dehiscing on both sutures; pod.

**leian-thus:** smooth-flowered.

**Lemma.** In grasses, the flowering glume,—the lower of the two bracts immediately inclosing the flower.

**lepidophyl-lus:** scaly-leaved.

**Lepidote.** Surfaced with small scurfy scales.

**lep-topus:** thin- or slender-stalked or -footed.

**leucan-thus:** white-flowered.

**leuconeu-rus:** white-nerved.

**ligno-sus:** woody.

**ligula-ris:** ligulate, strap-shaped.

**Ligule.** A strap-shaped organ or body; particularly, a strap-shaped corolla, as in the ray-flowers of composites; also a projection from the top of the sheath in grasses and similar plants.

**Limb.** The expanded flat part of an organ; in particular, the expanding part of a gamopetalous corolla.

**Linear.** Long and narrow, the sides parallel or nearly so.

**Lineate.** Lined; bearing thin parallel lines.

**lingula-tus:** tongue-shaped.

**Lip.** One of the parts in an unequally divided corolla or calyx; these parts are usually two, the upper lip and the lower lip, although one lip is sometimes wanting; the upper lip of orchids is by a twist of the stipe made to appear as the lower; a labium.

**littora-lis:** of the seashore.

**loba-tus:** lobed.

**Lobe.** Any part or segment of an organ; specifically a part of petal or calyx or leaf that represents a division to about the middle.

**Lobule.** A small lobe.

**Locule.** Compartment or cell of a pistil or anther.

**Loculicidal.** Dehiscence on the back, between the partitions into the cavity.

**lophan-thus:** crest-flowered.

**lorifo-lius:** strap-leaved.

**lu-cidus:** lucid, bright, shining, clear.

**luna-tus:** lunate, moon-shaped, moon-like, crescent-shaped.

**lupuli-nus:** Lupulus-like, hop-like.

**lu-ridus:** lurid, wan, sallow, pale yellow.

**lutes-cens:** yellowish, becoming yellow.

**lu-teus:** yellow.

**Lyrate.** Pinnatifid, but with an enlarged terminal lobe and smaller lower lobes.

**Macrospore.** The larger of the two kinds of spores in Selaginella and related plants.

**macula-tus:** spotted.

**magellan-icus:** Strait of Magellan region.

**magnif-icus:** magnificent, eminent, distinguished.

**maja-lis:** of May, Maytime.

**malifor-mis:** apple-formed.

**malva-ceus:** Malva-like, mallow-like; **mal-væfo-rus:** mallow-flowered.

**mandshur-icus, mandschur-icus,** and other spellings: of Manchuria (northeastern Asia).

**manica-tus:** manicate, long-sleeved, covered densely as with thick hairs so that the covering can be removed as such.

**margari-tus, margarita-ceus:** pearly, of pearls.

**margin-a-tus:** margined.

**mariland-icus:** of the Maryland region; also written **maryland-icus** and **maria-nus**.

**marit-imus:** maritime, of the sea.

**marmora-tus:** marbled, mottled.

**marocca-nus:** of Morocco.

**mas:** male.

**Masculine.** Staminate (in higher plants).

**matrona-lis:** pertaining to matrons.

**mauritan-icus:** of Mauretania (N. Africa).

**max-imus:** largest.

**mediopic-tus:** pictured or striped at the center.

**mediterræ-neus:** of the Mediterranean region.

**me-dius:** medium, intermediate.

**melanchol-icus:** melancholy, hanging or drooping.

**melanocar-pus:** black-fruited.

**melanox-ylon:** black-wooded.

**melanthe-rus:** black-anthered.

**melea-gris:** like a guinea-fowl, speckled.

**-merous.** In composition, referring to the numbers of parts; as flowers 5-merous, in which the parts of each kind or series are five or in fives.

**metal-icus:** metallic (color or luster).

**mi-cans:** glittering, sparkling, mica-like.

**Microspore.** The smaller of the two kinds of spores in such pteridophytes as Selaginella.

**Midrib.** The main rib of a leaf or leaf-like part, a continuation of the petiole.

**milia-ceus:** pertaining to millet.

**minia-tus:** cinnabar-red.

**mi-nor, mi-nus:** smaller.

**mi-tis:** mild, gentle.

**mœsi-acus:** of the Balkan region (the ancient Mœsians).

**mol-lis:** soft, soft-hairy.

**mollis-simus:** very soft-hairy.

**molucca-nus:** of the Moluccas (East Indies).

**Monadelphous.** Stamens united in one group by their filaments as in many Leguminosæ.

**Monœcius.** Staminate and pistillate flowers on the same plant.

**Monogynous.** With one style.

**monsessula-nus:** of Montpellier.

**monta-nus:** pertaining to mountains or mountainous regions.

**monteviden-sis:** of Montevideo (Uruguay).

**mosa-icus:** parti-colored, as of a mosaic.

**moscha-tus:** musky, musk-scented.

**Mucro.** A short and sharp abrupt tip.

**mucrona-tus:** mucronate, tipped with a short sharp point or mucro.

**multic-olor:** many-colored.

**Multifid.** Cut or cleft into many narrow lobes or parts.

**multiradia-tus:** many-radiate, with numerous rays.

**mura-lis:** of walls, growing on walls.



## TERMS AND NAMES

**murica-tus:** muricate, roughed by means of hard points.  
**musa-icus:** Musa-like.  
**musco-sus:** mossy.  
**mutab-ilis:** changeable, changing color.

*Naked flower.* With no floral envelopes.  
**nanel-lus:** very small or dwarf.  
**na-nus:** dwarf.  
**narbonen-sis:** of Narbonne (ancient region or province of S. France).  
**natalen-sis:** of Natal, S. Africa.  
**na-tans:** floating, swimming.  
**neapolita-nus:** Neapolitan, of Naples.  
**nebulu-sus:** nebulous, clouded, indefinite, obscure; making a cloud (of bloom or sprays).  
**nepalen-sis:** of Nepal (Himalayan region).  
**neriifo-lius:** Nerium-leaved, oleander-leaved.  
**nervo-sus:** nerved.  
**ni-ger:** black.  
**nigres-cens:** blackish, becoming black.  
**nig-ricans:** blackish, swarthy.  
**nigrofruc-tus:** black-fruited.  
**nit-idus:** shining.  
**niva-lis:** snowy, pertaining to snow.  
**niv-eus:** snowy.  
**nivo-sus:** snowy, full of snow.  
**nob-ilis:** noble, famous, renowned.  
**noctur-nus:** of the night, night-blooming.  
*Node.* A joint where a leaf is borne or may be borne; also incorrectly the space between two joints, which is properly an internode.  
**nodu-sus:** with nodes, jointed.  
**nonpinna-tus:** not pinnate (in comparison with those that are pinnate).  
**nonscrip-tus:** undescribed.  
**nootkaten-sis, nutkaten-sis:** of Nootka (Nootka Sound is by Vancouver Island).  
**novæ-an-gliæ:** of New England.  
**novi-bel-gi:** of New Belgium (one-time name for New York).  
**nucif-era:** nut-bearing.  
**nudicau-lis:** naked-stemmed.  
**nudiflo-rus:** naked-flowered.  
**nu-dus:** nude, naked.  
**numid-icus:** of Numidia (ancient country of N. Africa).  
*Nut.* An indehiscent 1-celled and 1-seeded hard and bony fruit, even if resulting from a compound ovary.  
**nu-tans:** nodding.  
*Nutlet.* A small or diminutive nut; nucule.

**Ob-** A Latin syllable, usually signifying inversion; as *obconical*, inversely conical; cone attached at the small point; *oblanceolate*, inversely lanceolate; with the broadest part of a lanceolate body away from the point of attachment; *obovate*, inverted ovate; *obovoid*, an ovoid body attached at the smaller end.

*Oblique.* Slanting; unequal-sided.  
*Oblong.* Longer than broad, and with the sides nearly or quite parallel most of their length.  
*Obsolete.* Not evident or apparent; rudimentary.

*Obtuse.* Blunt, rounded.  
**occidenta-lis:** occidental, western.  
**ochna-ceus:** Ochna-like.  
**ochroleu-cus:** yellowish-white.  
**odessa-nus:** of Odessa (Black Sea region).  
**odo-rus, odora-tus, odorif-era:** odorous, fragrant; **odoratis-simus:** most fragrant.  
**officina-lis:** official, medicinal, recognized in the pharmacopœa.  
**officina-rum:** of the apothecaries.  
**oleif-era:** oil-bearing.  
**olera-ceus:** oleraceous, vegetable-garden herb used in cooking.  
*Oligo-* In Greek compounds, signifying few, as *oligandrous*, with few stamens.  
**olito-rius:** pertaining to vegetable-gardens or -gardeners.  
**olym-picus:** of Olympus or Mt. Olympus (in Greece).  
**opa-cus:** opaque, shaded, not transparent.  
**opercula-tus:** with a lid.  
**opulifo-lius:** Opulus-leaved (referring to *Viburnum Opulus*).  
**orbicula-tus:** round or circular, disk-shaped.  
**orchioi-des, orchio-des:** orchid-like.  
**orgya-lis:** length of the arms extended, about 6 feet.  
**orienta-lis:** oriental, eastern.  
**orna-tus:** ornate, adorned.  
*Ortho-* In Greek compounds, signifying straight, as *orthotropous* (ovule or seed), an erect straight seed with the micropyle at the apex and hilum at the base.  
**ovalifo-lius:** oval-leaved.  
*Ovary.* Ovule-bearing part of a pistil.  
*Ovate.* With an outline like that of hen's egg cut in two lengthwise, the broader end downward.  
**ovi-nus:** pertaining to sheep.  
*Ovoid.* A solid that is oval (less correctly ovate) in flat outline.  
*Ovule.* The body which, after fertilization, becomes the seed.

**pubular-ius:** of fodder or pasturage.  
**pacif-icus:** of the Pacific, of regions bordering the Pacific Ocean.  
**palæsti-nus:** of Palestine.  
*Palate.* In personate corollas, a rounded projection or prominence of the lower lip, closing the throat or very nearly so.  
*Palea, pælet.* In the grass flower, the upper of the two inclosing bracts, the lower one being the lemma.  
**pal-lidus:** pale.  
*Palmate.* Lobed or divided or ribbed in a palm-like or hand-like fashion; digitate, although this word is usually restricted to leaves compound rather than to merely ribbed or lobed.  
*Palmatifid.* Cut about half way down in a palmate form.  
**palmifo-lius:** palm-leaved.  
**palus-tris:** marsh-loving.  
**pandura-tus:** fiddle-shaped.  
*Panicle.* A branching raceme; flower-cluster in which the branches are racemose, the flowers being pedicellate.

## TERMS AND NAMES

**panicula-tus:** paniculate.  
**panno-sus:** ragged, tattered.  
*Papilionaceous corolla.* Butterfly-like; pea-like flower, with a standard, wings, and keel.  
*Pappus.* Peculiar calyx-limb of composites, being plumose, bristle-like, scales, or otherwise.  
**papyrif-era:** paper-bearing.  
**paradisi-acus:** of parks or gardens.  
**pardali-nus:** leopard-like, spotted.  
*Parietal.* Borne on the paries or wall (inner surface) of a capsule.  
*Parted.* Cleft or cut not quite to the base.  
**pa-tens:** spreading.  
**pat-ulus:** spreading.  
**pauciflo-rus:** few-flowered.  
**pavoni-nus:** peacock-like.  
**pectina-tus:** pectinate, comb-like, pinnatifid with very narrow close divisions or parts.  
*Pedate.* Said of a palmately lobed or divided leaf of which the two side lobes are again 2-cleft.  
*Pedicel.* Stem of one flower in a cluster.  
*Peduncle.* Stem of a flower-cluster or of a solitary flower.  
**peduncula-tus:** peduncled.  
**pekinen-sis:** of Peking, China.  
*Pellucid.* Clear, transparent; that can nearly be seen through.  
*Peltate.* Attached to its stalk inside the margin; peltate leaves are usually shield-shaped.  
**pen-dulus:** pendulous, hanging.  
**penna-tus:** feathered, as the veins or lobes standing off at right angles from a midrib; pinnate.  
*Penninerved.* Nerves arising along the length of a central midrib.  
**peregri-nus:** exotic, foreign, from a strange country.  
*Perennial.* Of three or more seasons' duration.  
**perfolia-tus:** perfoliate, with leaf surrounding the stem.  
*Perianth.* The floral envelope considered together; commonly used for flowers in which there is usually no clear distinction between calyx and corolla, as the lilies.  
*Pericarp.* The ripened ovary.  
*Perigynous.* Borne around the ovary and not beneath it, as when calyx, corolla and stamens are borne on the edge of a cup-shaped hypanthium; such cases are said to exhibit perigyny.  
**per-sicus:** of Persia; also the peach.  
*Persistent.* Remaining attached; not falling off.  
*Personate.* Said of a two-lipped corolla the throat of which is closed by a palate, as in toad-flax.  
**petula-tus:** wallet-like or pocket-like.  
*Petal.* One of the separate leaves of a corolla.  
*Petaloid.* Petal-like; of color and shape resembling a petal.  
**petiola-ris:** petioled, with a leaf-stalk.  
**petiola-tus:** petioled.  
*Petiole.* Leaf-stalk.  
*Petiolule.* Stalk of a leaflet.  
**philadel-phi-cus:** of the Philadelphia (Pa.) region.

**phlogifo-rus:** flame-flowered, phlox-flowered.  
**phœnic-eus:** purple-red.  
*Phyllodium.* Leaf-like petiole and no blade, as in some acacias and other plants.  
**pictura-tus:** painted-leaved, pictured, variegated.  
**pic-tus:** painted.  
**pilea-tus:** with a cap.  
**pilo-sus:** pilose, shaggy, with soft hairs.  
*Pinna.* A primary division or leaflet of a pinnate leaf.  
*Pinnate.* Feather-formed; with the leaflets of a compound leaf placed on either side of the rachis.  
*Pinnatifid.* Cleft or parted in a pinnate (rather than palmate) way.  
*Pinnatisect.* Cut down to the midrib in a pinnate way.  
*Pinnule.* A secondary pinna or leaflet in a pinnately decompound leaf.  
**pisif-era:** Pisum-bearing, pea-bearing.  
*Pistil.* The ovule-bearing and seed-bearing organ, with style and stigma.  
*Pistillate.* Having pistils and no stamens; female.  
*Pitted.* Having little depressions or cavities.  
*Placenta.* Part or place in the ovary where ovules are attached.  
**planifo-lius:** flat-leaved.  
**plantagin-eus:** plantain-like.  
**pla-nus:** plane, flat.  
**platanoi-des:** Platanus-like, plane-tree-like.  
**plica-tus:** plicate, plaited, folded lengthwise.  
**pluma-rius:** plumed.  
*Plumose.* Plumy; feather-like; with fine hairs, as the pappus of some composites.  
*Pod.* A dehiscent dry pericarp; a rather general uncritical term.  
**poet-icus:** pertaining to poets.  
**poli-tus:** polished.  
*Pollen.* Spores or grains borne by the anther, containing the male element; sometimes it is not granular.  
*Pollinium.* A coherent mass of pollen, as in orchids and milkweeds.  
*Polygamous.* Bearing unisexual and hermaphrodite flowers on the same plant.  
*Pome.* Fruit of apple, pear, quince, and similar things.  
**pomeridia-nus:** afternoon.  
**pomif-era:** pome-bearing.  
**pompo-nius:** of a tuft or topknot; pompons are small-headed button-like races, as in chrysanthemum and dahlia.  
**pon-ticus:** of Pontus (in Asia Minor).  
**popul-neus:** pertaining to poplars.  
**porrifo-lius:** Porrum- or leek-leaved.  
**portoricens-sis:** of Porto Rico.  
**portula-ceus:** Portulaca-like.  
*Posterior.* At or toward the back; opposite the front; toward the axis; away from the subtending bract.  
**præ-cox:** precocious, premature, very early.  
**praten-sis:** of meadows.  
**pravis-simus:** very crooked.  
*Prickle.* A small and weak spine-like body borne irregularly on the bark or epidermis.

## TERMS AND NAMES

**primuli-nus:** primrose-yellow.  
**prin-ceps:** princely, first.  
*Procumbent.* Trailing or lying flat, but not rooting.  
*Proliferous.* Bearing offshoots or redundant parts; bearing other similar structures on itself.  
**prolif-icus:** prolific, fruitful.  
**prostra-tus:** prostrate, lying flat.  
*Prothallus.* The gametophyte stage or generation of pteridophytes, a cellular and usually flattened thallus-like structure on the ground, bearing the sexual organs, as the antheridia and archegonia.  
*Pruinose.* Having a "bloom" on the surface.  
*Pseud-Pseudo-* In combinations means *false*, *not genuine*, *not the true* or *the typical*.  
*Pseudobulb.* The thickened or bulb-form stems of certain orchids, the part being solid and borne above ground.  
**psiloste-mon:** slender- or naked-stamened.  
**pteran-thus:** with winged flowers.  
*Puberulent.* Somewhat or minutely pubescent.  
*Pubescent.* Covered with short soft hairs; downy.  
**pudi-cus:** bashful, retiring, shrinking.  
**pugionifor-mis:** dagger-formed.  
**pulchel-lus:** pretty, beautiful.  
**pul-cher:** handsome, beautiful.  
**pulcher-rimus:** very handsome.  
**pulverulen-tus:** powdered, dust-covered.  
**pu-milus:** dwarf.  
*Punctate.* With translucent or colored dots or depressions or pits.  
*Pungent.* Ending in a stiff sharp point or tip; also acrid (to the taste).  
**punic-eus:** reddish-purple, crimson.  
**purpuras-cens:** purplish, becoming purple.  
**purpura-tus:** purple.  
**purpu-reus:** purple.  
**pycnacan-thus:** densely spined.  
**pygmæ-us:** pigmy.  
**pyramida-lis:** pyramidal.  
**pyrena-icus:** of the Pyrenees.  
*Pyrene, pyrena.* Nutlet, particularly the nutlet in a drupe.  
*Pyriform.* Pear-formed or -shaped.  
**quadric-olor:** of four colors.  
*Raceme.* A simple, elongated, indeterminate cluster with stalked flowers.  
**racemiflo-rus:** raceme-flowered.  
**racemo-sus:** racemose, flowers in racemes.  
*Rachilla, rhachilla.* A diminutive or secondary axis, or rachis; in particular, in the grasses and sedges the axis that bears the florets.  
*Rachis.* Axis bearing flowers or leaflets; petiole of a fern frond (plural *rachides* or *rachises*).  
*Radiate.* Standing on and spreading from a common center; also, with ray-flowers, as in the Compositæ.  
*Radical.* Belonging or pertaining to the root.  
**radi-cans:** rooting.  
**rad-ula:** rough, like a scraper.  
**mo-sus:** branched.  
**pa-ceus:** pertaining to turnips

*Ray.* Outer modified florets of some composites, with an extended or strap-like part to the corolla; also the branches of an umbel or umbel-like cluster.  
*Receptacle.* Torus; the more or less enlarged or elongated end of the stem or flower-axis on which some or all of the flower-parts are borne; sometimes the receptacle is greatly expanded, as in the Compositæ; sometimes it assumes capsule-like forms, as in the hypanthium of the rose.  
*Reckinate, reclining.* Bent down or falling back from the perpendicular.  
**rec-tus:** straight, upright.  
*Recurved.* Bent or curved downward or backward.  
**redivi-vus:** restored, brought to life.  
*Reflexed.* Abruptly recurved or bent downward or backward.  
**refrac-tus:** broken, broken in pieces.  
**rega-lis:** regal, royal.  
**Regi-na:** Queen.  
**re-gius:** regal, royal, kingly, pertaining to a king.  
*Regular flower.* With the parts in each series or set alike; as stamens all like each other, petals all like each other.  
**religio-sus:** used for religious purposes, venerated, sacred.  
*Reniform.* Kidney-shaped.  
**re-pens:** repent, creeping.  
**rep-tans:** creeping.  
**reticula-tus:** reticulate, netted, net-veined.  
**retor-tus:** twisted back.  
**retrofrac-tus:** broken or bent backwards.  
*Retorse.* Bent or turned over back or downward.  
**retu-sus:** retuse, notched slightly at a rounded apex.  
*Revolute.* Rolled backward, margin rolled toward lower side. See *Involute*.  
**Rex:** king.  
*Rhizome.* Underground stem; rootstock.  
**rhombifo-lius:** leaves rhombic.  
**rhomboida-lis:** of rhombic outline.  
*Rib.* In a leaf or similar organ, the primary vein; also any prominent vein or nerve.  
**ri-gens:** rigid, stiff.  
**rig-idus:** rigid, stiff.  
**ripa-rius:** of river banks.  
**rivula-ris:** brook-loving.  
**robust-tus:** robust, stout.  
*Rootstock.* Subterranean stem; rhizome.  
**rosæflo-rus:** rose-flowered.  
**ro-seus:** rose, rosy.  
**rostra-tus:** rostrate, beaked.  
*Rotate.* Wheel-shaped; with short or obsolete tube and a flat and circular limb.  
*Rotund.* Nearly circular; orbicular inclining to be oblong.  
**rotundiflo-lius:** round-leaved.  
**rubel-lus:** reddish.  
**ru-bens:** red, ruddy.  
**ru-ber:** red.  
**rubigino-sus:** rusty.  
**ru-dis:** wild, not tilled.  
**ru-go-sus:** rugose, wrinkled.

## TERMS AND NAMES

*Runner.* A slender trailing shoot taking root at the nodes.  
*rupes-tris:* rock-loving.  
*rupic-olus:* growing on cliffs or ledges.  
*rustica-nus:* rustic, pertaining to the country.  
*ruthen-icus:* Ruthenian (Russian).

*sacchara-tus:* containing sugar, sweet.  
*sacchari-nus:* saccharine.  
*sac-charum:* of sugar.  
*sachalinen-sis:* of Saghalin Isl. (N. Japan).  
*sacro-rum:* sacred, of sacred places.  
*sagitta-lis, sagitta-tus:* of the arrow, sagittate, arrow-like.

*Sagittate.* Like an arrowhead in form; triangular with the basal lobes pointing downward.

*salici-nus, sal-icis, salig-nus:* willow-like, of the willow.

*Salver-shaped.* With a slender tube and an abruptly expanded flat limb, as that of the phlox; hypocrateriform.

*Samara.* Indehiscent winged pericarp, as of the maple and ash.

*sanguin-eus:* bloody, blood-red.

*sap-idus:* savory, pleasing to taste.

*sapien-tum:* of the wise men or authors.

*sarmento-sus:* sarmentose, bearing runners.

*sati-vus:* cultivated.

*saxat-ilis:* found among rocks.

*scab-er:* scabrous, rough, not smooth.

*scaber-rimus:* very rough or scabrid.

*Scabrous.* Rough; feeling roughish or gritty to the touch.

*Scale.* A name given to many kinds of small mostly dry and appressed leaves or bracts; a vestige.

*scan-dens:* scandent, climbing.

*Scape.* Leafless peduncle arising from the ground; it may bear scales or bracts but no foliage-leaves and may be one- or many-flowered.

*Scarious.* Leaf-like parts or bracts that are not green, but thin, dry, and membranaceous, often more or less translucent.

*scep-trum:* of a scepter.

*schizopet-alus:* with cut petals.

*scopa-rius:* broom or broom-like.

*Scorpioid.* Said of a coiled cluster in which the flowers are 2-ranked and borne alternately at the right and the left.

*scuta-tus:* buckler-shaped, like a small shield.

*sebif-era:* tallow-bearing.

*secun-dus, secunda-tus:* second, side-flowering.

*Seed.* The ripened ovule; the essential part is the embryo, and this is contained within integuments.

*seg-etum:* of cornfields.

*Segment.* One of the parts of a leaf, petal, calyx, or perianth that is divided but not truly compound.

*semidecan-drus:* half ten-stamened, with about 5 stamens.

*semperflo-rens:* ever flowering.

*semper-virens:* ever green.

*seni-lis:* senile, old, white-haired.

*Sepal.* One of the separate leaves of a calyx.

*se-pium:* of hedges or fences.

*Septate.* Partitioned; divided by partitions.

*Septicidal.* Dehiscence along or in the partitions, not directly into the locale.

*Septum.* A partition.

*sericof-era, sericif-era:* silk-bearing.

*serot-inus:* late, late-flowering or late-ripening.

*serpenti-nus:* of snakes, serpentine, looping or waving.

*serra-tus:* serrate, saw-toothed.

*serrula-tus:* serrulate, somewhat serrate.

*sesquipeda-lis:* one foot and a half long or high.

*Sessile.* Not stalked; sitting.

*sessilifo-lius:* sessile-leaved, without petiole.

*Seta.* A bristle.

*Setiform.* Bristle-shaped.

*setig-era:* bristly, bristle-bearing.

*seto-sus:* setose, full of bristles.

*Sheath.* Any long or more or less tubular structure surrounding an organ or part.

*Shrub.* A woody plant that remains low and produces shoots or trunks from the base.

*sibir-icus:* of Siberia.

*sic-ulus:* of Sicily.

*signa-tus:* marked, designated, attested.

*Silicle.* The short fruit of certain Cruciferae.

*Silique.* The long fruit of certain Cruciferae.

*Silky.* A condition produced by a covering of soft appressed fine hairs; sericeous.

*Silvery.* With a whitish metallic more or less shining luster.

*sim-ilis:* similar, like.

*sim-plex:* simple, unbranched.

*simplicifo-lius:* simple-leaved.

*sinen-sis:* Chinese, of China.

*sinua-tus:* sinuate, wavy-margined.

*Sinus.* The space or recess between two lobes of a leaf or other expanded organ.

*Smooth.* Said of surfaces that have no hairiness, roughness or pubescence, particularly of those not rough or scabrous. See *Glabrous*.

*sobolif-era:* bearing creeping rooting stems or shoots.

*Solitary.* Borne singly or alone.

*somnif-era:* sleep-bearing or -producing.

*Sorus.* A heap or cluster. The fruit-dots or -clusters of ferns (plural *sori*.)

*Spadix.* A thick or fleshy spike of certain plants, as the Araceae, surrounded or subtended by a spathe.

*Spatha.* The bract or leaf surrounding or subtending a flower-cluster or a spadix; it is sometimes colored and flower-like, as in the calla.

*specio-sus:* showy, good-looking.

*spectab-ilis:* spectacular, worth seeing, remarkable, showy.

*specula-tus:* shining, as if with mirrors.

*sphæroceph-alus:* spherical-headed.

*spica-tus:* spicate, with spikes.

*Spike.* Compact more or less simple indeterminate, mostly elongated cluster with flowers sessile or nearly so.

## TERMS AND NAMES

- Spikelet.** A secondary spike; one part of a compound spike; particularly, one of the ultimate clusters in grasses.
- Spine.** A strong and sharp-pointed woody body mostly arising from the wood of the stem.
- Spinescent.** More or less spiny.
- spino-sus:** full of spines; **spinosis-simus:** most or very spiny.
- splen-dens:** splendid.
- splen-didus:** splendid.
- Sporangium.** A spore-case; a sac or body bearing spores.
- Spore.** A simple reproductive body, usually composed of a single detached cell, and containing no embryo; used particularly in the pteridophytes and lower orders.
- Sporocarp.** A receptacle containing sporangia or spores.
- Sporophyll.** A spore-bearing leaf.
- Spreading.** Standing outward or horizontally.
- Spur.** A tubular or sac-like projection from a blossom, as of a petal or sepal; it usually secretes nectar.
- spu-rius:** spurious, false, bastard.
- squama-tus:** squamate, with squamæ or small scale-like leaves or bracts; **squamig-era:** scale-bearing; **squamo-sus:** squamate, full of scales.
- squarro-sus:** squarrose; as ordinarily used, with parts spreading or even recurved at ends.
- Stachys-**. In Greek compounds, signifying a spike.
- Stalk.** The stem of any organ, as the petiole, peduncle, pedicel, filament, stipe.
- Stamen.** The pollen-bearing or male organ.
- Staminate.** Having stamens and no pistils; male.
- stamin-eus:** bearing prominent stamens.
- Staminode, staminodium.** A sterile stamen, or a structure resembling such and borne in the staminal part of the flower; in some flowers (as in *Canna*) staminodia are petal-like and showy.
- Standard.** The upper and broad more or less erect petal of a papilionaceous flower.
- stans:** standing, erect, upright.
- stella-tus:** stellate, starry; often said of hairs that have radiating branches from base or of separate hairs similarly aggregated.
- stellip-ilus:** with stellate hairs.
- Stem.** The main axis of a plant; leaf-bearing and flower-bearing as distinguished from the root-bearing axis.
- ster-ilis:** sterile, infertile.
- Stigma.** The part of the pistil that receives the pollen.
- Stigmatic.** Pertaining to the stigma.
- Stipe.** The stalk of a pistil or other small organ; also the petiole of a fern-leaf.
- Stipel.** Stipule of a leaflet.
- Stipule.** A basal appendage of a petiole; the three parts of a complete leaf are blade, petiole, stipules (usually 2).
- Stolon.** A shoot that bends to the ground and takes root; more commonly, a horizontal stem at or below surface of the ground that gives rise to a new plant at its tip.
- stolonif-era:** bearing stolons or runners that take root.
- stramineofruc-tus:** with straw-colored fruit.
- stria-tus:** striated, striped.
- Strict.** Straight and upright, little if any branched, often rigid.
- Strobile.** Cone.
- strumo-sus:** strumous, having cushion-like swellings.
- Style.** More or less elongated part of the pistil between the ovary and stigma.
- stylo-sus:** with style or styles prominent.
- suave-olens:** sweet-scented.
- sua-vis:** sweet, agreeable.
- Sub-**. As a prefix, usually signifying somewhat, slightly or rather.
- Subtend.** To stand below and close to, as a bract underneath a flower, particularly when the bract is prominent or persistent. The flower is in the axil of the bract.
- subula-tus:** subulate, awl-shaped.
- Succulent.** Juicy; fleshy; soft and thickened in texture.
- sudanen-sis:** of the Sudan.
- suec-icus:** of Sweden.
- Suffrutescent.** Pertaining to a low and somewhat woody plant; diminutively shrubby or fruticose; woody at base.
- Sulcate.** Grooved or furrowed lengthwise.
- sulphu-reus:** sulfur-colored.
- super-bus:** superb, proud.
- Superior.** Said of an ovary that is free from the calyx or perianth.
- suspen-sus:** suspended, hung.
- Suture.** A line or mark of splitting open; a groove marking a natural division or union; the groove lengthwise a plum or similar fruit.
- sylvat-icus:** sylvan, forest-loving (also written *silvaticus*).
- sylves-tris, sylves-ter:** of woods or forests.
- Symmetrical.** Said of a flower that has the same number of parts in each series or circle, as five stamens, five petals.
- Syncarpous.** Having carpels united. See *Apocarpous*.
- Tapering.** Gradually becoming smaller or diminishing in diameter or width toward one end; not abrupt.
- tarta-reus:** with a loose or rough crumbling surface.
- tatar-icus:** of Tartary (old name for Central Asia).
- tech-nicus:** technical, special.
- tecto-rum:** of roofs or houses.
- temulen-tus:** drunken.
- te-nax:** tenacious, strong.
- Tendril.** A rotating or twisting thread-like process or extension by which a plant grasps an object and clings to it for support; morphologically it may be stem or leaf.
- te-ner:** slender, tender, soft.
- ten-uis:** slender, thin; **tenu-ior:** more slender.
- terebinth-inus:** of turpentine.



## TERMS AND NAMES

*Terete*. Circular in transverse section; imperfectly cylindrical because the object may taper both ways.

*tereticor-nis*: with terete or cylindrical horns.

*termina-lis*: terminal, at the end of a stem or branch.

*Ternate*. In threes.

*tessella-tus*: tessellate, laid off in squares or in dice-like pattern.

*testa-ceus*: light brown, brick-colored; also *testaceous*, bearing a prominent testa or outer seed-coat.

*tetragonol-obus*: with four-angled pod.

*tex-tilis*: textile, woven.

*Thallus*. A flat leaf-like organ; in some cryptogams, the entire cellular plant body without differentiation as to stem and foliage.

*Throat*. The opening or orifice into a gamopetalous corolla, or perianth; the place where the limb joins the tube.

*thuyoi-des, thuyoi-des*: like Thuja (*Thuja*) or arbor-vitæ.

*Thyrse, thyrsus*. Compact and more or less compound panicle; more correctly a panicle-like cluster with main axis indeterminate and other parts determinate.

*thyrsiflo-rus*: thyrse-flowered.

*thyrsoid-eus*: thyrse-like.

*tigri-nus*: tiger-striped.

*tilia-ceus*: Tilia-like (likelinden or basswood).

*tincto-rius*: belonging to dyers, of dyes.

*Tomentose*. With tomentum; densely woolly or pubescent; with matted soft wool-like hairiness.

*Tomentulose*. Somewhat or delicately tomentose.

*tortuo-sus*: much twisted.

*torulo-sus*: somewhat torose or contracted at intervals.

*Torus*. Receptacle.

*Tree*. A woody plant that produces one main trunk and a more or less distinct and elevated head.

*tremuloi-des*: like Tremulus, the trembling poplar.

*trem-ulus*: quivering, trembling.

*Tri-*. Three or three times.

*trichocar-pus*: hairy-fruited.

*Trichoma*. A hair or bristle.

*trichosan-thus*: hairy-flowered.

*trif-idus*: three-cleft.

*trimes-tris*: of three months, as lasting that period or maturing within it.

*Trilernate*. Three times three; the leaflets or segments of a twice ternate leaf again in three parts.

*trivia-lis*: common, ordinary, very frequent, found everywhere.

*Truncate*. Appearing as if cut off at the end; the base or apex nearly or quite straight across.

*Tuber*. A short congested part; usually defined as subterranean (as of a rootstock), although this is not essential.

*Tubercle*. A small tuber, or rounded protruding body.

*tubero-sus*: tuberous.

*Tunicated*. Provided with concentric or enwrapping coats or layers, as bulb of onion.

*Turgid*. Swollen from fullness.

*uligino-sus*: of wet or marshy places.

*Umbel*. Corymbose or indeterminate cluster with branches or rays arising from a common point and about equal in length, resembling framework of umbrella; umbels are characteristic of the Umbelliferae.

*Umbellate*. Umbelled; with umbels; pertaining to umbels.

*umbro-sus*: shaded, shade-loving.

*uncina-tus*: hooked at the point.

*unda-tus*: waved.

*undula-tus*: undulated, wavy.

*unguicula-ris*: clawed, narrowed to a petiole-like base.

*Unisexual*. Of one sex; staminate only or pistillate only.

*u-rens*: burning, stinging.

*urticifo-lius*: nettle-leaved (*Urtica*).

*usitatis-simus*: most commonly used.

*u-tilis*: useful.

*utilis-simus*: most useful.

*Utricle*. A small bladder; a bladdery 1-seeded fruit.

*va-gans*: wandering, vagrant.

*valdivia-nus, valdivien-sis*: Valdivian, of province or region of Valdivia (Chile).

*Valvate*. Opening by valves or pertaining to valves; meeting by the edges without overlapping, as leaves or petals in the bud.

*Valve*. A separable part of a pod; the units or pieces into which a capsule splits or divides in dehiscing.

*variab-ilis*: variable, of many forms.

*varico-sus*: varicose, veins or filaments dilated.

*variega-tus*: variegated.

*variifo-lius*: variable-leaved.

*va-rius*: various, diverse, changeable.

*ve-lox*: rapidly growing.

*Venation*. Veining; arrangement or disposition of veins.

*veno-sus*: veiny.

*Ventral*. Front; relating to the anterior or inner face or part of an organ; opposite the back or dorsal part.

*ventrico-sus*: ventricose, swelling or inflated on one side or unevenly.

*venus-tus*: handsome, charming.

*Vernation*. The disposition or arrangement of leaves in the bud.

*ver-nus, verna-lis*: of spring, vernal.

*verruco-sus*: verrucose, warted.

*verruculo-sus*: very warty or verrucose.

*Versatile*. Hung or attached near the middle and usually moving freely, as an anther attached crosswise on the apex of filament and capable of turning.

*versic-olor*: variously colored, as of one color passing into another, or changing in color.

*Verticil*. A whorl.

*verticilla-tus*: verticillate, whorled, arranged in a circle about the stem.



## TERMS AND NAMES

**ve-rus:** the true or genuine or standard.

**ves-cus:** weak, thin, feeble.

**vesperti-nus:** of the evening, western.

**vesti-tus:** covered, clothed as with hairs or pubescence.

**vexilla-rius:** of the standard petal (as of pea-like flowers), with a standard.

**Villous.** Provided with long and soft, not matted, hairs; shaggy.

**vimina-lis:** of osiers, of basket willows.

**vinif-era:** wine-bearing.

**viola-ceus:** violet.

**virga-tus:** twiggy.

**vir-idis:** green; **viridis-simus:** greenest, very green; **viridiflo-rus:** green-flowered.

**visco-sus:** viscid.

**vita-ceus:** Vitis-like.

**vitelli-nus:** dull yellow approaching red.

**vitifo-lius:** Vitis-leaved, grape-leaved.

**vitta-tus:** striped.

**vivip-arus:** freely producing asexual propagating parts, as bulblets in the inflorescence.

**volu-bilis:** twining.

**vomito-rius:** emetic.

**vulcan-icus:** of Vulcan or of a volcano, volcanic.

**vulga-ris:** vulgar, common, usual.

**Whorl.** Three or more leaves or flowers at one node, in a circle.

**Wing.** A thin, dry or membranaceous expansion or flat extension or appendage of an organ; also the lateral petals of a papilionaceous flower

**Woolly.** Provided with long, soft and more or less matted hairs; like wool; lanate.

**xan-thinus:** yellow.

**xanthorrhizus:** yellow-rooted.

**yedoen-sis:** of Yedo or Yeddo (Japan).

**yunnanen-sis:** of Province of Yunnan, China.

**zebri-nus:** zebra-striped.

**zeylan-icus:** Ceylonian, of Ceylon; Cingalese; same as *ceylanicus*.

**zona-lis, zona-tus:** zonal, zoned, banded.

## AUTHORITIES FOR THE BINOMIALS

When the student finds "*Asparagus officinalis*, L.," he is to understand that the authority for the same is Linnæus (L.)—the person who first put the two words together to designate this particular kind of plant, with proper description. When he finds "*Iris halophila*, Pall.," he knows that Pallas made the name; the citation of the author identifies the species, gives a clue to its place of publication and its history, and distinguishes it from the plant called *I. halophila* by Ker or by any other author. The authority is not part of the plant name, but it becomes so closely associated with the binomial as to be cited whenever botanical and historical accuracy is necessary. In common popular writing and speech it is seldom necessary, or even in good taste, to cite the authority.

To save space and to give the presentation a simpler aspect, most names of authors are abbreviated when used in connection with the binomial. The present list explains what the abbreviations mean, and also provides certain information about the authors, for the most common or significant occurrences in this Manual.

Sometimes the species is transferred to another genus from the one in which it was first described. The species-name follows it wherever it goes. The name of the original author, in such cases, is sometimes cited in parentheses and the author of the accepted combination follows it, as *Ipomœa purpurea* (L.) Roth, which means that Linnæus first employed the name but in another connection (under *Convolvulus*) and that Roth transferred it to *Ipomœa*, where it now rests. This method of double citation is not employed in this book; the authorities here cited are those responsible for the current binomial, genus and species together.

The following list will be useful also in identifying the authors of genera; thus "*Chrysalidocarpus*, Wendl.," means that Hermann Wendland founded the genus.

ADANS. Michael Adanson, 1727–1806. France.

AIT. William Aiton, 1731–1793. England.

AIT. f. William Townsend Aiton, the son, 1766–1849. England.

ALL. Carlo Allioni, 1725–1804. Italy.

ANDERS., T., Thomas Anderson, 1832–1870, director of Botanic Garden in Calcutta.

ANDR. Henry C. Andrews, botanical artist and engraver, conducted The Botanists'

Repository from 1799–1811, and illustrated books on heaths, geraniums and roses.

ANDRÉ. Eduard André, 1840–1911, first editor of *L'Illustration Horticole*, later editor-in-chief of *Revue Horticole*.

ARN. George Arnold Walker Arnott, 1799–1868. Scotland.

ASCHERS. Paul Ascherson, 1834–1913, professor of botany, Berlin.

# AUTHORITIES FOR THE BINOMIALS

- AUBL. J. B. C. F. Aublet, 1720-1778. France.  
AUCT., AUTH. Authors; referring to usage by various or many writers.
- BAILEY. L. H. Bailey, contemporary.  
BAILL. H. Baillon, 1827-1895, author of the natural history of plants in French.  
BAKER. John Gilbert Baker, 1834-1920, Keeper of the Herbarium of the Royal Botanic Gardens, Kew, England.  
BEAN. W. J. Bean, contemporaneous, curator, Royal Botanic Gardens, Kew, England.  
BEAUV. Ambroise Marie Francois Joseph Palisot de Beauvois, 1755-1820. France.  
BECC. Odoardo Beccari, 1843-1920, Italian botanist and world authority on palms.  
BEISSN. L. Beissner, contemporary German botanist.  
BENTH. George Bentham, 1800-1884, England; one of the authors of Bentham & Hooker "Genera Plantarum."  
BERNH. Johann Jacob Bernhardt, 1774-1850. Germany.  
BIEB. Friedrich August Marschall von Bieberstein, 1768-1826, German botanist; lived later in Russia.  
BIGEL. Jacob Bigelow, 1787-1879. Massachusetts.  
BLUME. Karl Ludwig Blume, 1796-1862. Wrote much on Javan plants.  
BOISS. Edmond Boissier, 1810-1886. Switzerland. Author of "Flora Orientalis."  
BOJER. W. Bojer, 1800-1856, author of "Hortus Mauritianus." Austria.  
BORKE. Moritz Balthasar Borkhausen, 1760-1806. Germany.  
BRITT. Nathaniel Lord Britton, contemporaneous, director of New York Botanical Garden, New York City.  
BRONGN. Adolphe Theodore Brongniart, 1801-1876. France.  
B.S.P. N. L. Britton, E. A. Sterns, J. Poggenburg, authors of a catalogue of plants growing within 100 miles of New York City, 1888.  
BUCH.-HAM. Francis Buchanan, later Lord Hamilton, 1762-1829, British botanist, wrote on Indian plants.  
BUCKL. Samuel Botsford Buckley, 1809-1884. United States.  
BULL. William Bull, plant merchant, died 1902. London.  
BUNGE. Alexander von Bunge, 1803-1890. Russia.  
BURB. Frederick William Burbidge, 1847-1905, British botanist.
- CARR. Elie Abel Carrière, 1816-1896, editor of *Revue Horticole*.  
CASS. Comte de Alexandre Henri Gabriel Cassini, 1781-1832. France.  
CAV. Antonio Jose Cavanilles, 1745-1804. Spain.  
C. CHR. Carl Christensen. Contemporaneous Danish botanist.  
CHAM. Adalbert von Chamisso, poet and naturalist, 1781-1838. Germany.
- CHAPM. Alvan Wentworth Chapman, 1809-1899, author of "Flora of the Southern United States."  
CHOIS. Jacques Denys Choisy, 1799-1859. Switzerland.  
CHRIST. Hermann Christ, contemporaneous Swiss botanist.  
COGN. Alfred Cogniaux, 1841-1916, French botanist.  
CURT. William Curtis, 1746-1799. England. Founder of the Botanical Magazine.
- DC. Augustin Pyramus de Candolle, 1778-1841, projector of the Prodrômus, and head of a distinguished family. A. D. C., Alphonse de Candolle, the son (1806-1893), and C. D. C., Casimir de Candolle, the grandson (1836-1918).  
DECNE. Joseph Decaisne, 1809-1882. France.  
DESF. René Louiche Desfontaines, 1750-1833. France.  
DESV. Augustin Nicaise Desvieux, 1784-1856. France.  
DIELS. Ludwig Diels, contemporaneous German botanist.  
DILL. Johann Jacob Dillenius, 1687-1747, professor of botany in Oxford.  
DIPP. L. Dippel, 1827-1914, author of "Handbuch der Laubholzkunde."  
DON. George Don, 1798-1856. England.  
DON, D. David Don, brother of George, 1800-1841. Scotland.  
DONN. James Donn, 1758-1813, author of "Hortus Cantabrigiensis." England.  
DOUGL. David Douglas, 1799-1834, collector in northwestern America. Scotland.  
DRUDE. O. Drude, contemporaneous German botanist.  
DRY. Jonas Dryander, 1748-1810. Sweden.  
DUCHESNE. Antoine Nicolas Duchesne, 1747-1827. France.  
DUMORT. Barthélemy Charles Dumortier, 1797-1878. Belgium.  
DUNAL. Michel Felix Dunal, 1789-1856. France.
- EATON, D. C. Daniel Cady Eaton, 1834-1895, professor at Yale and writer on ferns.  
EHRH. Friedrich Ehrhart, 1742-1795. Germany.  
ELL. Stephen Elliott, 1771-1830. South Carolina.  
ENDL. Stephan Ladislaus Endlicher, 1804-1849, professor at Vienna.  
ENGELM. George Engelmann, 1809-1884. Missouri.  
ENGLER. A. Engler, contemporaneous German botanist, joint author of Engler and Prantl's "Natürlichen Pflanzenfamilien."
- FÉE. Antoine Laurent Apollinaire Fée, 1789-1874. France.  
FISCH. Friedrich Ernst Ludwig von Fischer, 1782-1854. Russia.  
F. MUELL. Ferdinand von Mueller, 1825-1896, royal botanist of Australia, author of works on economic plants.

## AUTHORITIES FOR THE BINOMIALS

- FORSK.** Pehr Forskal, 1736-1768, collected in Egypt and Arabia.
- FORST.** Johann Reinhold Forster, 1729-1798. Germany. (Also Georg Forster, son.)
- FRANCH.** A. Franchet, 1834-1900. Jardin des Plantes, Paris.
- FROEL.** Joseph Aloys Froelich, 1766-1841. Germany.
- GAERTN.** Joseph Gaertner, 1732-1791. Germany.
- GAGNEP.** Francois Gagnepain, contemporaneous French botanist.
- GAUD.** Charles Gaudichaud-Beaupré, 1789-1864. France.
- GAWL.** See Ker.
- GMEL.** Samuel Gottlieb Gmelin, 1743-1774. Russia.
- GRAEBN.** Paul Graebner, professor of botany. Berlin. Contemporary.
- GRAY.** Asa Gray, 1810-1888, Harvard University, Massachusetts; noted American botanist.
- GRISEB.** Heinrich Rudolph August Grisebach, 1814-1879, author of "Flora of the British West Indian Islands." Germany.
- HARMS.** Hermann Harms, contemporaneous German botanist.
- HASSK.** Justus Karl Hasskarl, 1811-1894. Germany.
- HAW.** Adrian Hardy Haworth, 1772-1833. England.
- HBK.** Friedrich Alexander von Humboldt, 1796-1859. Germany. Aimé Bonpland, 1773-1858. France. Karl Sigismund Kunth, 1788-1850. Germany. Authors of a great work on plants of the New World.
- HEMSEL.** W. Botting Hemsley, contemporaneous, formerly keeper of Herbarium at Kew, England.
- HENRY.** Augustine Henry, contemporaneous, British collector of Chinese plants, and dendrologist.
- HERB.** William Herbert. 1778-1847. England.
- HOFFM.** Georg Franz Hoffman, 1761-1826. Germany.
- HOOK.** William Jackson Hooker, 1785-1865. England.
- HOOK. f.** Joseph Dalton Hooker, the son, 1817-1911. England.
- HORT.** Hortorum, literally of the gardens. Placed after names current among horticulturists, but not necessarily of all horticulturists. Often used with less exactness than names of authors; frequently indicates garden or unknown origin. Many of these plants have never been sufficiently described.
- HOST.** Nicolaus Thomas Host, 1761-1834. Germany.
- JACQ.** Nicolaus Joseph Jacquin, 1727-1817. Austria.
- J. SM.** John Smith, 1798-1888, British botanist.
- JUSS.** Antoine Laurent Jussieu, 1748-1836, the first to introduce the natural families of plants. France.
- KAULF.** Georg Friedrich Kaulfuss, professor at Halle; died 1830. He described the ferns collected by Chamisso.
- KER., KER-GAWL.** John Bellenden Ker, 1765 (?) -1842, botanist, wit, and man of fashion. First known as John Gawler. In 1793 was compelled to leave army because of sympathy with French Revolution. His name was changed in 1804 to John Ker Bellenden, but he was known to his friends as Bellenden Ker. First editor of Edwards' Botanical Register.
- KLOTZSCH.** Johann Friedrich Klotzsch, 1805-1860, curator of Royal herbarium at Berlin, monographer of Begoniaceæ.
- KOCH.** Karl Koch, 1809-1879. Germany.
- KOEHN.** Emil Koehne, 1848-1918, author of "Deutsche Dendrologie."
- KRÄNZL.** F. Kränzlin, Berlin. Contemporary.
- KUNTZE.** Otto Kuntze, 1843-1907. German botanist, known as a strong advocate of priority in nomenclature.
- KUNZE.** Gustav Kunze, 1793-1851, author of work on ferns, published at Leipzig.
- L.** Carolus Linnæus (Carl von Linné), 1707-1778, the "Father of Botany," and author of binomial nomenclature. Sweden.
- L.f.** Carl von Linné, the son, 1741-1783. Sweden.
- LABILL.** Jacques Julien Houton de La Billardière, 1755-1834, French botanist and traveler.
- LAM.** Jean Baptiste Antoine Pierre Monnet Lamarck, 1744-1829, author of the Lamarckian philosophy of organic evolution. France.
- LEDEB.** Karl Friedrich von Ledebour, 1785-1851. Russia.
- LEHM.** Johann Georg Christian Lehmann, 1792-1860, professor at Hamburg.
- LEICHT.** Max Leichtlin, 1831-1910, horticulturist, Baden-Baden, Germany.
- LEM.** Charles Lemaire, 1800-1871, works on cacti and botany of cultivated plants. Belgium.
- L'HER.** C. L. L'Heritier de Brutelle, 1746-1800. France.
- LIND.** J. Linden, 1817-1898. Belgium. For many years director of L'Illustration Horticole.
- LIND., L.** Lucien Linden, associated with J. Linden for some years on L'Illustration Horticole.
- LINDL.** John Lindley, 1799-1865, English horticulturist and botanist.
- LINK.** Heinrich Friedrich Link, 1767-1851. Germany.
- LODD.** Conrad Loddiges, died 1820, and George, his son (1784-1846), nurserymen near London, conducted Loddiges' Botanical Cabinet from 1817-34, 20 vols., 2,000 colored plates.
- LOISEL.** Jean Louis Auguste Loiseleur-Deslongchamps, 1774-1849. France.
- LOUD.** John Claudius Loudon, 1783-1843, prolific English writer.

# AUTHORITIES FOR THE BINOMIALS

- LOUR. Juan Loureiro, 1715-1796, missionary and botanist in China. Portugal.
- MAKINO. Tomitaro Makino, contemporary botanist of Japan.
- MARSH. Humphrey Marshall, 1722-1801. Pennsylvania.
- MART. Karl Friedrich Philipp von Martius, 1794-1868, professor at Munich, monographer of palms, founder of the great "Flora Brasiliensis."
- MAST. Maxwell T. Masters, 1833-1907. editor of *The Gardeners' Chronicle*.
- MAXIM. Karl Johann Maximowicz, 1827-1891, Russian systematic botanist.
- MEDIC. Friedrich Casmir Medicus, 1736-1808, director of the garden at Mannheim, wrote on North American plants in 1792.
- MEISN. Karl Friedrich Meisner, 1800-1874. Switzerland.
- MERR. E. D. Merrill, contemporaneous. Philippines.
- METT. Georg Heinrich Mettenius, 1823-1866, professor at Leipzig.
- MEY., C. A. Carl Anton Meyer, 1795-1855, director botanic garden at St. Petersburg.
- MEZ. Dr. Karl Mez, director of the botanic garden at Königsberg; monographer of the bromeliads. Contemporary.
- MICHX. André Michaux, 1746-1802. France, but for ten years a resident of North America.
- MICHX. f. Francois André Michaux, the son, 1770-1855. France.
- MILL. Philip Miller, 1691-1771, of Chelsea, England, author of a celebrated dictionary of gardening which had many editions.
- MIQ. Friedrich Anton Wilhelm Miquel, 1811-1871. Holland.
- MITF. A. B. Freeman-Mitford, Lord Redesdale, 1837-1916, author of "The Bamboo Garden."
- MOENCH. Konrad Moench, 1744-1805. Germany.
- MOORE. Thomas Moore, 1821-1887, curator of Chelsea Botanic Garden, author of "Index Filicum."
- MOQ. Alfred Moquin-Tandon, 1804-1863. France.
- MORR. Charles Jacques Edouard Morren, 1833-1886. Ghent.
- MUELL. ARG. Jean Mueller, of Aargau, Switzerland. 1828-1896.
- MUHL. Henry Ludwig Muhlenberg, 1756-1817. Pennsylvania.
- NAUD. Charles Naudin, 1815-1899, frequent contributor to *Revue Horticole*.
- N. E. BR. N. E. Brown, contemporaneous British botanist, Kew.
- NEES. Christian Gottfried Nees von Esenbeck, 1776-1858. Prussia.
- NICHOLS. George Nicholson, 1847-1908, curator at Kew, author of "The Illustrated Dictionary of Gardening."
- NUTT. Thomas Nuttall, 1786-1859. Massachusetts.
- OLIV. Daniel Oliver, 1830-1917, keeper of the Herbarium at the Royal Botanic Gardens, Kew.
- OTTO. Friedrich Otto, 1782-1856. Germany.
- PALL. Peter Simon Pallas, 1741-1811, professor and explorer in Russia.
- PAMPAN. Renato Pampanini, contemporaneous writer on Chinese plants. Florence, Italy.
- PAX. Ferdinand Pax, contemporary German botanist.
- PAXT. Joseph Paxton, 1802-1865. England.
- PERS. Christian Hendrick Persoon, 1755-1837. Germany.
- PFITZ. E. Pfitzer, 1846-1906, German botanist.
- PHIL. Rudolph Amandus Philippi, 1808-1904. Santiago, Chile.
- PLANCH. Jules Emile Planchon, 1833-1900, professor at Montpellier. France.
- POIR. Jean Louis Marie Poiret, 1755-1834. France.
- PRESL. Karel Boriweg Presl, 1794-1852. Bohemia.
- PURSH. Frederick T. Pursh (or Pursch), 1774-1820. Germany, but for twelve years in the United States.
- RAF. Constantino Samuel Rafinesque-Schmaltz, 1784-1842, professor of natural history, Transylvania University. Lexington, Kentucky.
- R. BR. Robert Brown, 1773-1858, British botanist. London.
- REGEL. Eduard von Regel, 1815-1892, German, founder of *Gartenflora*; director Botanic Garden at St. Petersburg.
- REHD. Alfred Rehder, Arnold Arboretum, Massachusetts, contemporaneous.
- REICH. Heinrich Gottlieb Ludwig Reichenbach, 1793-1879. Germany.
- REICH. f. Heinrich Gustav, 1823-1889, son of the preceding. Orchids.
- RICH. Louis Claude Marie Richard, 1754-1821. France.
- RIV. Auguste and Charles Riviére. France.
- ROB. B. L. Robinson, contemporaneous, director Gray Herbarium of Harvard University.
- ROEM. Johann Jacob Roemer, 1763-1819. Switzerland. Also M. J. Roemer.
- ROSE. J. N. Rose, contemporaneous, assistant curator, United States National Herbarium, Smithsonian Institution.
- ROXB. William Roxburg, 1759-1815. India.
- RUIZ & PAV. Hipolito Ruiz Lopez, 1764-1815, and José Pavon, died 1844, authors of a *Flora* of Peru and Chile. Spain.
- RUPR. Franz J. Ruprecht, 1814-1870. Russia.
- RYDB. Per Axel Rydberg, New York Botanical Garden, contemporaneous.
- SAFFORD. W. E. Safford, United States Department of Agriculture, Washington, contemporaneous botanist.
- SALISB. Richard Anthony Salisbury, 1761-1829. England.



## AUTHORITIES FOR THE BINOMIALS

- SALM-DYCK.** Joseph, 1773-1861, Prince and High Count Salm-Reifferscheid-Dyck, born at Dyck. Germany.
- SARG.** Charles Sprague Sargent, contemporaneous, director Arnold Arboretum, Boston.
- SAVI.** Gaetano Savi, died 1844. Italy.
- SCHK.** Christian Schkuhr, died 1811. Germany.
- SCHLECHT.** Diedrich Franz Leonhard von Schlechtendahl, 1794-1866. Professor at Halle.
- SCHNEID.** Camillo Schneider, contemporaneous, author of "Handbuch der Laubholzkunde." Vienna and Berlin.
- SCHOTT.** Heinrich Wilhelm Schott, 1794-1865. Germany.
- SCHRAD.** Heinrich Adolph Schrader, 1767-1836. Germany.
- SCHULT.** Joseph August Schultes, 1773-1831. Germany.
- SCHUM.** Karl Moritz Schumann, 1851-1904, professor of botany, Berlin.
- SCHW.** Lewis David von Schweinitz, 1780-1834. Pennsylvania.
- SCOP.** Johann Anton Scopoli, 1723-1788. Italy.
- SIEB. & ZUCC.** Philipp Franz von Siebold, 1796-1866, and Joseph Gerhard Zuccarini, 1797-1848. Germany.
- SIMS.** John Sims, 1792-1838. England, for many years editor of Curtis' Botanical Magazine.
- SM.** James Edward Smith, 1759-1828. England.
- SM., J.** See J. Sm.
- SMALL.** John Kunkel Small, contemporaneous botanist, New York Botanical Garden.
- SOLAND.** Daniel Solander, 1736-1782. England.
- SPACH.** Eduard Spach, 1801-1879. Strassburg.
- SPRENG.** Kurt Sprengel, 1766-1833. Germany.
- STEUD.** Ernst Gottlieb Steudel, 1783-1856. Germany.
- ST. HIL.** Auguste de Saint Hilaire, 1779-1853. France.
- SUDW.** George B. Sudworth, contemporaneous dendrologist, U. S. Forest Service.
- SW.** Olof Swartz, 1760-1818. Sweden.
- SWEET.** Robert Sweet, 1783-1835, British horticulturist and botanist.
- SWINGLE.** Walter T. Swingle, contemporaneous botanist, United States Department of Agriculture, Washington.
- THUNB.** Carl Peter Thunberg, 1743-1822, wrote "Flora Japonica" (1784), and "Flora Capensis." Sweden.
- TORR.** John Torrey, 1796-1873. New York.
- TREL.** William Trelease, contemporaneous, professor of botany, University of Illinois.
- TRIN.** Carl Bernhard Trinius, 1778-1844. Russia.
- UNDERW.** Lucien M. Underwood, 1853-1907, American botanist, specialist on ferns.
- URBAN.** Ignatius Urban, contemporaneous German botanist, writer on Brazilian and West Indian plants.
- VAHL.** Martin Vahl, 1749-1804. Denmark.
- VAN HOUTTE.** Louis Van Houtte, 1810-1876, founder and publisher of Flore des Serres.
- VEITCH.** John Gould Veitch, 1839-1867, and successors, horticulturists at Chelsea, England.
- VENT.** Etienne Pierre Ventenat, 1757-1808. France.
- VILM.** Several generations of the family of Vilmorin, Paris, seedsmen and authors of many books and memoirs on botany and horticulture. Pierre Philippe André Leveque de Vilmorin, 1746-1804. Pierre Vilmorin, 1816-1860. Henry L. de Vilmorin, died 1899.
- VOSS.** A. Voss, contemporaneous German botanist, author of botanical part of Siebert & Voss "Vilmorin's Blumengärtnerei."
- WAHL.** Georg Wahlenberg, 1781-1851. Sweden.
- WALL.** Nathaniel Wallich, born 1786, Copenhagen, died 1854. London. Wrote on plants of India and Asia.
- WALP.** Wilhelm Gerhard Walpers, 1816-1853.
- WALT.** Thomas Walter, about 1740-1788, author of "Flora Caroliniana." South Carolina.
- WANG.** Friedrich Adam Julius von Wangelheim, 1747-1800. Germany.
- WATS.** Sereno Watson, 1826-1892. Harvard University.
- WENDL.** Hermann Wendland, 1825-1903, director Royal Botanic Garden at Herrenhausen, writer on palms.
- WIGHT.** Robert Wight, 1796-1872, writer on Indian plants.
- WILLD.** Karl Ludwig Willdenow, 1765-1812. Germany.
- WILS.** Ernest H. Wilson, Arnold Arboretum, Boston, contemporaneous author and collector.
- WITTM.** Max Karl Ludwig Wittmack, contemporaneous German horticulturist and botanist, editor of Gartenflora.
- ZABEL.** Hermann Zabel, 1832-1912, writer on woody plants. Germany.
- ZUCC.** Joseph Gerhard Zuccarini, 1797-1848, professor at Munich.



## ABBREVIATIONS AND EXPLANATIONS

<i>caps.</i> .....	capsule	<i>lf.</i> .....	leaf
<i>cent.</i> .....	central	<i>lft.</i> .....	leaflet
<i>cult.</i> .....	cultivated, cultivation	<i>lfts.</i> .....	leaflets
<i>diam.</i> .....	diameter	<i>lvs.</i> .....	leaves
<i>E.</i> .....	East	<i>mts.</i> .....	mountains
<i>fl.</i> .....	flower	<i>N.</i> .....	North
<i>fld.</i> .....	flowered	<i>S.</i> .....	South
<i>fls.</i> .....	flowers	<i>segm., segms.</i> .....	segment, segments
<i>fr.</i> .....	fruit	<i>st., sts.</i> .....	stem, stems
<i>frs.</i> .....	fruits	<i>subtrop.</i> .....	subtropical
<i>ft.</i> .....	foot, feet	<i>temp.</i> .....	temperate
<i>hort.</i> .....	horticulture, horticultural	<i>trop.</i> .....	tropical
<i>in.</i> .....	inch, inches	<i>var.</i> .....	variety (of a species)
<i>infl.</i> .....	inflorescence	<i>W.</i> .....	West
<i>isl., isls.</i> .....	island, islands		

The most persistent abbreviation in the book is the use of the initial letter to represent the generic name. Thus, in *Agaricus*, which is the first genus, the letter *A.* is used to introduce the species, *A. campestris* meaning *Agaricus campestris*, and *A. subrufescens* meaning *Agaricus subrufescens*; and so on through the book.

Such words as *acaulescent*, *calyx-tube*, are recognized descriptive terms in systematic botany. They are not used here as morphological terms.

When dimensions of leaves are given, they are intended to apply to the leaf-blade, and do not include the petiole unless so stated; in the case of grasses and similar plants, they do not include the leaf-sheath.

PART II  
THE FLORA

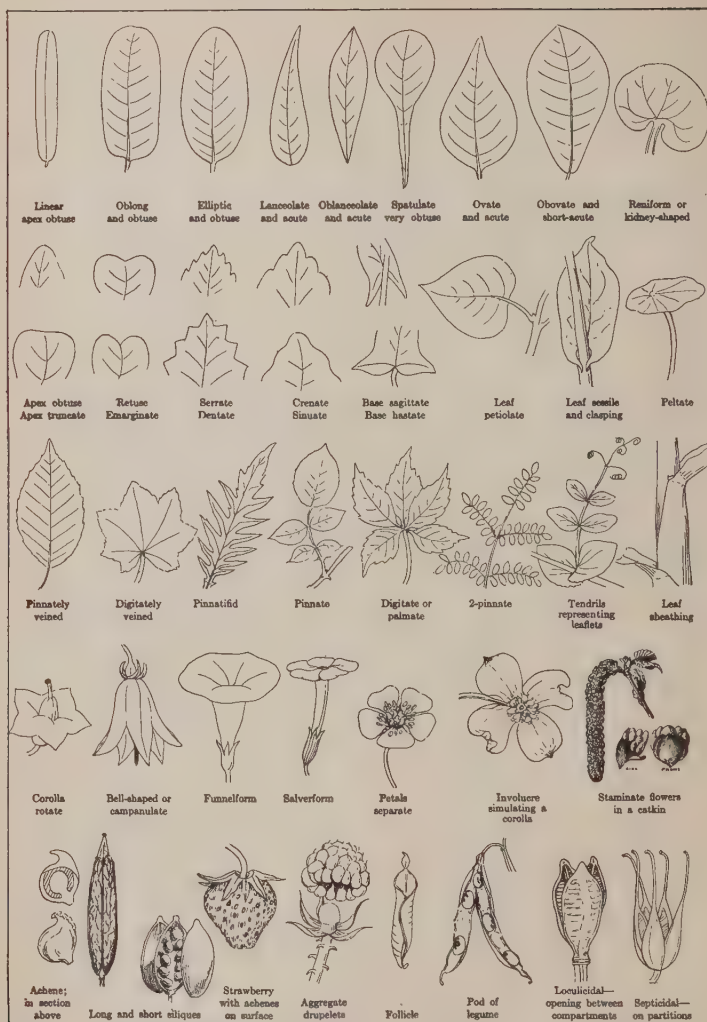


FIG. 3. GLOSSARY.

Illustration of terms employed in descriptions of leaves, flowers, and fruits

## THE VEGETABLE COMMUNITY

The community of organisms known broadly as Plants, is divisible into four great groups or subcommunities.

### I. Subcommunity THALLOPHYTA. The THALLOPHYTES.

Usually not chlorophyll-bearing, destitute of vascular tissue, with little or no woody structure, seldom exhibiting well-marked alternation of generations; the plant body is thalloid—without differentiation of stems and leaves; there is no archegonium and no antheridium as known in the Pteridophyta; propagation is by spores and division.—The lowest in organization of the four great Subcommunities, including the bacteria, the diatoms, desmids and multicellular algæ, myxomycetes, lichens, fungi. Many of the plants are microscopic and detached, often motile; others, as some of the great seaweeds, are of large bulk and attached to rocks or the sea-bed. Most of them lack the green color of ordinary vegetation, and many of them are colorless. Most of the “diseases” of plants are reactions to the attacks of parasitic fungi. The Thallophytes are of many families and genera, and of thousands of species, on all parts of the globe. Only one genus is included in this Manual (*Agaricus*).

### II. Subcommunity BRYOPHYTA. MOSSES and LIVERWORTS.

Small green plants, simple in structure, sometimes with merely a thalloid body and in other groups with stem and differentiated leaves, but without true roots and vascular system. The alternation of generations is well marked, and the gametophyte is the dominant one. They are without flowers in the popular sense, and for the most part are not showy plants; none is cultivated, or included in this Manual. There are numerous families, genera, and species widely distributed on the earth, particularly in moist places.

### III. Subcommunity PTERIDOPHYTA. FERNS and FERN ALLIES.

Green plants with vascular tissue, true roots, and usually with clear differentiation of leaf (frond) and stem: alternation of generations distinct, the sporophyte or asexual generation constituting “the plant” as known to cultivators and others: gametophyte a small thallus-like body (prothallus), usually flat on the ground, bearing the eggs in a structure known as an archegonium and the sperm-cells in an antheridium; from the fertilization of the egg arises the sporophyte, which in turn produces asexual spores, the prothallus usually disappearing; from the asexual organs of the sporophyte arises the prothallus or gametophyte of the succeeding generation; the male cells or bodies are often motile; propagation by means of spores, without embryo.—This Subcommunity comprises the higher cryptogams, the more familiar of the so-called “flowerless plants.” It comprises some 6,000 widely distributed species, largely tropical. Many of them are choice and popular subjects in cultivation.

This Subcommunity divides itself into three main classes: 1. *Filicinæ*, the ferns and fern allies; 2. *Lycopodinæ*, the club-mosses and selaginellas; 3. *Equisetinæ*, equisetums or scouring-rushes, not represented in this book.

Formerly it was the custom to comprise all the ferns in one family, known

## THE VEGETABLE COMMUNITY

as Filices. Now, most authorities separate them into about 10 families. The recognized genera are 140 to 150. The nature of the veining between the midrib of the segment and the margin is significant; the veinlets are "free" when they are separate, not joined with others; they are anastomosing when they run together, joining other veinlets, sometimes forming a clear reticulation.

### IV. Subcommunity SPERMATOPHYTA. The SPERMATOPHYTES, or SEED-PLANTS.

Plants producing seeds, which contain an embryo or dormant plant that becomes active under favorable conditions and "germinates"; the male generative cells or bodies are usually not motile, and fertilization is effected by means of a tube that results from the "germination" of a pollen-grain and penetrates to the macrosporangium or ovule; plants green (with minor exceptions), containing chlorophyll.—The Spermatophyta are the highest in organization of the Vegetable Community, constituting the greater part of the vegetation of the earth, represented in many families and probably 130,000 or more known species. These are the "flowering plants" or phenogams as distinguished from all the lower orders formerly called "flowerless plants" or cryptogams, but these distinctions cannot be defended on morphological grounds. Usually the Spermatophytes bear distinct flowers, but it is only by the broadest definition that the reproductive parts of the Gymnosperms can be called flowers.

This Subcommunity divides itself as follows:

**Division I.** *Gymnospermæ*: ovules naked, not inclosed in an ovary.

**Division II.** *Angiospermæ*: ovules in a carpel or ovary.

**Class I.** *Monocotyledonæ*: seed-leaf 1.

**Class II.** *Dicotyledonæ*: seed-leaves 2 or more.

**Series I.** *Choripetalæ*: petals (or sepals) distinct or separate.

**Series II.** *Gamopetalæ*: petals (or sepals) united.



## KEY TO THE FAMILIES AS REPRESENTED IN THIS MANUAL

A Key is a device to enable the student to pursue a plant until he finds its name. It proceeds largely on a process of elimination, whereby the plant is carried from category to category until an agreement is reached, whereupon it can be taken no farther: at this point the student turns to the page on which a fuller description of the plant is indicated.

The Key now under discussion leads only to the Family, of which there are 167 in this book, from Agaricaceæ to Compositæ. If the plant in hand runs down to Family 25, Liliaceæ, the student leaves the key and goes to page 150, where the Lily Family is treated. There he finds another key, this time to genera, of which there are 41. If his plant leads to Genus 6, *Allium*, he turns to page 160 where he finds a key to the species, numbering 8. If his specimen runs to No. 5, and it agrees well with the diagnosis thereunder, he calls his plant *Allium fistulosum*.

The student must be prepared for perplexities and exceptions. Plants are not manufactured articles, and their characters cannot be formed or determined in advance. The Families are assemblages of plants that agree more than they differ; but there are marginal members, and in many cases outlying species that do not readily conform. It is the purpose of a key to lead not only to the typical or representative plants but also to the exceptions; yet it is quite impossible, in a treatment of this size and variety, to be sure that all the exceptional forms are caught, and moreover, the plants in this book have not been heretofore assembled in this way and there is therefore no long trial and experience to serve as a guide. A Key is not an integral part of a flora: it is an aid, added to the flora for the benefit of the student for what it may be worth; it has now come to be considered a necessity, however, and within recent years it has assumed a very definite character.

It is not necessary to say that the student must have a good specimen, with flowers and fruits, and that he must understand the morphology, or at least the organography, of the plant in hand. There is no reliable short-cut. Close and careful dissection, with a clear lens, and a patient persistent attitude, are essential if one is really to know the subject. Soon the discriminating sense develops. The main families take form in the mind, and after a

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time one is able to dispense with the big Family Key for many of his plants. Then genera begin to take form; and the student comes to good judgment as to what constitute significant agreements and differences. Then the subject becomes a source of continued and discriminating satisfaction.

I. Subcommunity THALLOPHYTA. 1. AGARICACEÆ. Page 59.

II. Subcommunity BRYOPHYTA. Not represented.

III. Subcommunity PTERIDOPHYTA. FERNS and FERN ALLIES.

- A. FILICINÆ, the ferns: fruiting bodies borne on the back or margin of foliage fronds or on specialized fronds: spores of one kind, borne in a case or sporangium that is circled by a ring or annulus of cells and that dehisces longitudinally (vertically), transversely or obliquely: sporangia collected into minute clusters known as sori or fruit-dots, which are usually covered by a scale or specialized reflexed frond-margin called an indusium.
- B. Climbing ferns (in the hort. species): sporangia sessile, ovate or ovoid, annulus close to and completely circling the apex, opening vertically, on specialized fronds and appearing spiked or panicle, without apparent indusia. Gg, Fig. 4 . . . 2. SCHIZÆACEÆ, 59
- BB. Tree ferns (in the hort. species): sporangia sessile or nearly so (but the sori sometimes elevated on a receptacle), obovoid, annulus complete, vertical, slightly oblique, not interrupted by the pedicel, opening obliquely or transversely, usually indusiate. Eee, Fig. 4 . . . . . 3. CYATHEACEÆ, 60
- BBB. Common erect ferns: sporangia stalked, various in shape, annulus vertical and interrupted by the pedicel, opening transversely, indusia usually evident. Bb, Fig. 4 . . . . . 4. POLYPODIACEÆ, 62
- AA. FERN-ALLIES: fruiting bodies not borne on the fronds: spores in some groups of two kinds, large and small,—macrospores and microspores,—the former producing prothallia that bear archegonia and the latter prothallia bearing antheridia.
- B. Plant body free-floating, the lvs. small and flat: fruiting bodies clustered on the under side of the st. . . . . 5. SALVINIACEÆ, 73
- BB. Plant rooting, moss-like, with small scale-form lvs. on very slender sts. . . . . 6. SELAGINELLACEÆ, 74

IV. Subcommunity SPERMATOPHYTA. SPERMATOPHYTES or SEED-PLANTS.

Division I. GYMNSOPERMÆ: the gymnosperms, with ovules not in an ovary, standing naked under scales: woody monœcious or diœcious plants, with seeds borne in cones or on a fleshy disk which becomes a berry-like body: lvs. scale-like, needle-shaped or linear or pinnate with narrow pinnæ, mostly stiff and evergreen (exception in the broad deciduous lvs. of Ginkgo): includes the conifers, yews, and cycads.

- A. Lvs. pinnate, persistent: trunk short, mostly unbranched. . . . 7. CYCADACEÆ, 77
- AA. Lvs. fan-shaped, deciduous: large branched tree. . . . . 8. GINKGOACEÆ, 77
- AAA. Lvs. simple, scale-like, needle-shaped or linear, mostly evergreen: branching trees and shrubs.
- B. Ovules 1 or 2 on a sporophyll, which becomes a fleshy berry-like body nearly inclosing the seed. . . . . 9. TAXACEÆ, 78
- BB. Ovules under persistent scales of a dry cone. . . . . 10. PINACEÆ, 80

Division II. ANGIOSPERMÆ: the fruit-plants, in which the ovules are contained in an ovary that matures into a fruit: plants of widely various character and habit, comprising the larger part of the cultivated flora.

Class I. MONOCOTYLEDONEÆ: embryo with 1 cotyledon, and the early lvs. alternate: lvs. mostly parallel-veined: parts of the fl. not in 5's, mostly in 3's or 6's: st. without annual layers or clear distinction of bark, wood, and pith, the cross-section revealing the woody fibers scattered through the tissue as in a stalk of maize or trunk of palm: preëminently herbs, but marked exceptions in certain liliads, pandanads, and grasses (bamboos), and particularly in palms.

- A. Plants of the palm type of foliage, with large stiff palmate or pinnate lvs.
- B. Ovary usually 1, 3-celled and 3-ovuled: fr. 1-seeded by abortion. 18. PALMACEÆ, 124
- BB. Ovary 1 and 1-celled but of 2 or 4 carpels, many-ovuled: fr. a syncarp . . . . . 19. CYCLANTHACEÆ, 132

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- AA. Plants not palm-like in foliage (lvs. not palmate or pinnate).
- B. Perianth 0: plant dioecious: stamens and pistils scattered on long or short rachis, not in regular fls.: fr. a heavy syncarp with large fibrous carpels: lvs. long and stiff and (in ours) spiny-edged.....11. PANDANACEÆ, 94
- BB. Perianth 0 or present: plant mostly not dioecious: stamens and pistils regularly placed in fls.: lvs., frs., and plants various.
- C. Carpel or at least the pistil 1, or if more than 1 then distinct in the fl. or soon separating.
- D. Species characteristically aquatic or paludose (of swamps), grown in ponds, aquaria and bogs: some or all the perianth-parts petaloid.
- E. Ovary superior.
- F. Perianth-parts usually 2, rarely 1 or 3, petaloid: lvs. sometimes lace-like.....12. APONOGETONACEÆ, 94
- FF. Perianth-parts 6, in 2 series, the inner ones petaloid.
- G. Ovules few: fr. indehiscent.....13. ALISMACEÆ, 95
- GG. Ovules numerous: fr. dehiscent.....14. BUTOMACEÆ, 95
- EE. Ovary inferior.....15. HYDROCHARITACEÆ, 96
- DD. Species not characteristically aquatic or paludose: perianth-parts not petaloid.
- E. Fls. very small, irregular, green, in the axils of specialized green or chaffy bracts (glumes) disposed in spikes or spikelets; ovary superior.
- F. Culms mostly hollow, terete or compressed: lf.-sheaths split: fr. a caryopsis.....16. GRAMINEÆ, 96
- FF. Culms solid, 3-angled: lf.-sheaths not split: fr. an achene.....17. CYPERACEÆ, 122
- EE. Fls. in a fleshy spadix attended by a single spathe; ovary inferior: frs. more or less separate and aggregated in a syncarp: lvs. various, but not palm-like.....20. ARACEÆ, 133
- CC. Carpels united into an evident compound ovary: fr. a caps. or berry.
- D. Stamen (or stamens) and pistil not grown together into a distinct organ.
- E. Lvs. or sts. usually scurfy or mealy: ovary usually inferior: plants mostly epiphytic.....21. BROMELIACEÆ, 142
- EE. Lvs. otherwise: not epiphytes.
- F. Fls. with 3 or 6 perfect stamens; perianth irregular; ovary superior.
- G. Outer perianth-parts green and calyx-like.....22. COMMELINACEÆ, 147
- GG. Outer series petaloid, like the inner.....23. PONTEDERIACEÆ, 149
- FF. Fls. with 3, 4, or 6 perfect stamens, regular or essentially so.
- G. Ovary superior.
- H. Perianth-parts green or neutral, stiff, not petal-like: fls. small and not showy: plant rush-like.....24. JUNCACEÆ, 150
- HH. Perianth-parts mostly large and showy: plants cult. for their bloom.....25. LILIACEÆ, 150
- GG. Ovary inferior, partially or completely.
- H. Stamens 6, or if 3 opposite the inner segms.
- I. Fls. showy, lily-like.....26. AMARYLLIDACEÆ, 177
- II. Fls. not showy, greenish and small: vines.....27. DIOSCOREACEÆ, 188
- HH. Stamens 3, opposite outer segms.....28. IRIDACEÆ, 190
- FFF. Fls. with 1 or 5 perfect stamens, and 1 or more staminodes, mostly very irregular.
- G. Staminode 1, not petaloid, anther-bearing stamens 5: very large-leaved plants.....29. MUSACEÆ, 200
- GG. Staminodes 1 or more, some or all of them broad and petal-like.
- H. Fertile stamen 1 or sometimes more, bearing a 2-celled anther.....30. ZINGIBERACEÆ, 202
- HH. Fertile stamen 1, bearing only 1 anther-cell.
- I. Ovules many in each cell: fr. capsular.....31. CANNACEÆ, 205
- II. Ovules single in each cell: fr. capsular or baccate.....32. MARANTACEÆ, 206
- DD. Stamen 1 (or 2) grown together with the pistil to form a gynandrium or column: fl. extremely irregular; ovary inferior.....33. ORCHIDACEÆ, 209

**Class II. DICOTYLEDONEÆ:** embryo normally with 2 opposite cotyledons, and the first lvs. above the cotyledons mostly opposite: lvs. usually prominently netted-veined, although the cross-veins may be masked by overlying tissue: parts of the fl. prevailing in 5's: st. with clear distinction of bark, wood and pith, or the pith disappearing with age in ligneous parts; the diam. is increased by the periodic addition of tissue on the outside of the woody cylinder underneath the bark, forming annual layers: here belong the trees and shrubs, with such exceptions as are indicated in Class I (page 48), and also great numbers of herbs.

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**Series I. CHORIPETALÆ** and similar plants (*Polypetalæ* and *Apetalæ*): petals wanting, or when present not all joined into one body. In certain cases, part of the petals are joined although perhaps more connate than organically united, as in *Fumariaceæ*, the 2 keel petals in many *Leguminosæ*, the 3 united petals of *Polygalaceæ*, and certain other exceptions; these cases are not likely to confuse the student; when petals are joined only at the very base and do not come off together, it is well to try the plant first in this Series.

- A. Corolla lacking; calyx present or absent, sometimes simulating a corolla.
  - B. Plants (trees) with jointed rush-like branchlets, and lvs. represented by minute scales. . . . . 34. *CASUARINACEÆ*, [221]
  - BB. Plants otherwise, ligneous or herbaceous, with ordinary foliage.
    - C. Fls. minute, bisexual or unisexual, and wholly devoid of floral envelopes but subtended by a bractlet, mostly in dense spikes. . . . . 35. *PIPERACEÆ*, 222
    - CC. Fls. unisexual (plant therefore monœcious or diœcious), one or both sexes in catkins or catkin-like heads. (*Amentiferæ*).
      - D. Staminate and pistillate fls. both in catkins.
        - E. Fr. many-seeded: plant diœcious. . . . . 36. *SALICACEÆ*, 223
        - EE. Fr. 1-seeded: plant usually monœcious.
          - F. Calyx evident: fr. succulent. . . . . 41. *MORACEÆ*, 234
          - FF. Calyx 0 or represented by scales.
            - G. Styles or stigmas 2. . . . . 38. *BETULACEÆ*, 228
            - GG. Style or stigma 1. . . . . 75. *PLATANACEÆ*, 338
        - DD. Staminate fls. in catkins, but pistillate single or few and subtended by involucre that in fr. becomes a bur or cup: plant usually monœcious.
          - E. Lvs. pinnate. . . . . 37. *JUGLANDACEÆ*, 227
          - EE. Lvs. simple. . . . . 39. *FAGACEÆ*, 230
        - DDD. Staminate fls. in dense or racemose catkins; pistillate in globular heads: plant mostly diœcious. . . . . 41. *MORACEÆ*, 234
      - CCC. Fls. not in catkins, unisexual or bisexual.
        - D. Cells or ovary (if simple) with only 1 or 2 ovules.
          - E. Pistils or distinct carpels more than 1, often numerous.
            - F. Calyx 0 (fl. naked of floral envelopes). . . . . 55. *TROCHODENDRA-* [CEE, 271
            - FF. Calyx present.
              - G. Sepals colored and petal-like. . . . . 56. *RANUNCULACEÆ*, [272
              - GG. Sepals not prominently colored or petaloid.
                - H. Fr. dry.
                  - I. An achene. . . . . 76. *ROSACEÆ*, 340
                  - II. A caps. or caps.-like, sometimes indehiscent. . . . . 104. *STERCULIACEÆ*, [497
                - HH. Fr. fleshy.
                  - I. A small berry, in racemes. . . . . 49. *PHYTOLACCACEÆ*, [255
                  - II. A large berry, 3 in. or more long. . . . . 57. *LARDIZABALACEÆ*, [286
            - E. Pistil 1, simple or compound.
              - F. Ovary free from calyx or calyx-tube. (superior), the calyx sometimes 0.
                - G. Nodes sheathed by stipules.
                  - H. Calyx none: large trees. . . . . 75. *PLATANACEÆ*, 339
                  - HH. Calyx evident: herbs. . . . . 45. *POLYGONACEÆ*, 244
                - GG. Nodes not so sheathed.
                  - H. Species of shrubs and trees.
                    - I. Lvs. alternate (rarely verticillate).
                      - J. Locule or cell of ovary 1 or 2 (for *Sapindaceæ* see JJ).
                        - K. Calyx with long cylindrical tube, often swollen at base. . . . . 43. *PROTEACEÆ*, 241
                        - KK. Calyx not tubular.
                          - L. Stamens opposite petals. . . . . 99. *RHAMNACEÆ*, 474
                          - LL. Stamens otherwise
                            - M. Insertion of stamens commonly on outer edge of disk. . . . . 112. *FLACOURTIACEÆ*, [509
                            - MM. Insertion of stamens not so.
                              - N. Styles and stigmas 2. . . . . 40. *ULMACEÆ*, 232
                              - NN. Styles and stigma 1.
                                - O. Anthers opening by lids attached at top. . . . . 63. *LAURACEÆ*, 295
                                - OO. Anthers opening lengthwise. . . . . 118. *THYMELÆACEÆ*, [528
                        - J. Locules or cells of ovary prevailing more than 2.
                          - K. Raphe directed toward axis of ovary: juice not milky.
                            - L. Stamens opposite petals and of same number. . . . . 99. *RHAMNACEÆ*, 474

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- LL. Stamens alternate with petals (if present; or opposite sepals), of the same or greater number.
- M. Lvs. simple and entire.
- N. Fr. a small berry..... 49. PHYTOLACCACEÆ, [255
- NN. Fr. a caps..... 96. SAPINDACEÆ, 468
- MM. Lvs. compound or dentate, or if simple and entire then the fr. a dehiscent caps.
- N. Disk in fl. developed between stamens and petals..... 96. SAPINDACEÆ, 468
- NN. Disk 0 or not apparent..... 88. BUXACEÆ, 458
- KK. Raphe directed away from axis of ovary: juice usually milky or acrid..... 87. EUPHORBIACEÆ, [451
- II. Lvs. opposite.
- J. Fr. a samara.
- K. Samara 1-celled, single..... 139. OLEACEÆ, 591
- KK. Samara 2-celled, double..... 94. ACERACEÆ, 466
- JJ. Fr. not a samara.
- K. Pod or caps. of 3 small carpels, each 2-seeded..... 88. BUXACEÆ, 458
- KK. Pod leathery and bur-like, with 1-3 large chestnut-like seeds..... 95. HIPPOCASTANACEÆ, [468
- HH. Species of herbaceous plants (sometimes more or less woody at base).
- I. Stigma (and style if present) only 1.
- J. Fls. bisexual..... 49. PHYTOLACCACEÆ, [255
- JJ. Fls. unisexual..... 42. URTICACEÆ, 240
- II. Stigmas (or styles) 2-3 or more.
- J. Fr. an achene..... 41. MORACEÆ, 234
- JJ. Fr. not an achene.
- K. Pistil of a single-celled and 1-ovuled ovary.
- L. Fls. subtended by scarious bracts.... 47. AMARANTHACEÆ, [251
- LL. Fls. not so.
- M. Lvs. alternate..... 46. CHENOPODIACEÆ, [249
- MM. Lvs. opposite..... 53. CARYOPHYLLACEÆ, [261
- KK. Pistil of 3 united carpels: fls. unisexual.
- L. Juice milky..... 87. EUPHORBIACEÆ, [451
- LL. Juice not so..... 88. BUXACEÆ, 458
- KKK. Pistil of 2-many united carpels ripening into a horned dry indehiscent body: fls. bisexual..... 50. AIZOACEÆ, 256
- FF. Ovary inferior, or at least completely and permanently immersed in the calyx-tube or hypanthium.
- G. Species of shrubs and trees.
- H. Lvs. and young shoots covered with scurfy pel-tate or stellate scales (the upper surfaces of lvs. sometimes nearly or quite glabrous).... 119. ELÆAGNACEÆ, [529
- HH. Lvs. and shoots not scurfy.
- I. Styles 2..... 74. HAMAMELIDACEÆ, [337
- II. Style 1.
- J. Fls. subtended by calyx-like showy or promi-nent bracts..... 48. NYCTAGINACEÆ, [254
- JJ. Fl. not so subtended..... 123. COMBRETACEÆ, 534
- GG. Species of herbs.
- H. Fl. subtended by united calyx-like bracts.... 48. NYCTAGINACEÆ, [254
- HH. Fls. not subtended..... 76. ROSACEÆ, 340
- DD. Cells or ovary with many (or at least 3 or more) ovules.
- E. Ovary superior.
- F. Pistils (or ovaries) 2 or more and separate..... 56. RANUNCULACEÆ, [272
- FF. Pistil 1.
- G. Cell 1 in the ovary.
- H. Lvs. strictly simple..... 112. FLACOURTIACEÆ, [509
- HH. Lvs. compound or deeply divided..... 56. RANUNCULACEÆ, [271
- GG. Cells 2-many in the ovary.
- H. Lvs. bearing pitchers..... 70. NEPENTHACEÆ, [315
- HH. Lvs. ordinary.
- I. Fr. large and fleshy, aromatic, dehiscent into mostly 2 valves, disclosing seed and aril.. 62. MYRISTICACEÆ, [294
- II. Fr. otherwise.
- J. Style 1..... 120. LYTHRACEÆ, 530



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J. Styles 2 or more, distinct or more or less united.

K. Fls. without evident disk.....104. STERCULIACEÆ, 497

KK. Fls. with prominent disk on which stamens are attached.....112. FLACOURTIACEÆ, 509

EE. Ovary inferior, or at least permanently involved in persistent calyx.

F. Cell of ovary 1.....123. COMBRETACEÆ, 534

FF. Cells 4-6.....44. ARISTOLOCHIACEÆ, 244

AA. Corolla and calyx present.

B. Species of floating water plants.....54. NYMPHÆACEÆ, 268

BB. Species of terrestrial plants, of uplands and bogs, not aquatic or floating.

C. Stamens more than 10, usually numerous or more than twice as many as petals.

D. Calyx or calyx-tube adherent to a compound ovary (i. e., ovary distinctly inferior or so invested as to appear to be so).

E. Plants with thick fleshy sts., mostly spiny, and usually without foliage lvs.....117. CACTACEÆ, 520

EE. Plants with ordinary not cactaceous appearance and with foliage lvs.

F. Fls. unisexual (monœcious): herbs, more or less succulent.....116. BEGONIACEÆ, 514

FF. Fls. bisexual: or if sometimes imperfect the plants not succulent.

G. Sepals or calyx-lobes 2: ovary with central or basal placenta: herbs.....51. PORTULACACEÆ, 259

GG. Sepals or calyx-lobes more than 2: ovary various.

H. Petals numerous.....50. AIZOACEÆ, 256

HH. Petals definite.

I. Stipules present.....76. ROSACEÆ, 340

II. Stipules 0.

J. All annual herbs, in our species.....115. LOASACEÆ, 513

JJ. All shrubs or trees.

K. Fr. large, dry and hard, dehiscent by a lid: lvs. not punctate.....122. LECYTHIDACEÆ, 533

KK. Fr. a berry, drupe or caps.: lvs. punctate.....124. MYRTACEÆ, 535

KKK. Fr. a large many-seeded apple-shaped body crowned with persistent calyx, seeds surrounded with pulp.....121. PUNICACEÆ, 533

KKKK. Fr. dry, winged.....138. STYRACACEÆ, 590

DD. Calyx or calyx-tube not joined to pistils or compound ovary (ovary typically superior).

E. Pistil 1, although perhaps comprised of 2 or more united carpels and sometimes more than 1 style.

F. Lvs. tubular, pitcher-form, radical.....70. (note). SARRACENIACEÆ, 316

FF. Lvs. ordinary.

G. Foliage punctate with pellucid dots: stamens often united at base into 3-5 bundles.....107. GUTTIFERÆ, 502

GG. Foliage and stamens otherwise.

H. Ovary 1-celled (in Bixaceæ, 110, apparently more than 1-celled by intrusion of false partitions).

I. Ovules 2.

J. Lvs. alternate.....76. ROSACEÆ, 340

JJ. Lvs. mainly opposite.....109. CISTACEÆ, 506

II. Ovules few to many.

J. Sepals 2 (only exceptionally 3): herbs.

K. Juice milky or colored: fls. regular....64. PAPAVERACEÆ, 296

KK. Juice not milky or colored: fls. regular or not.

L. Fls. very irregular.....65. FUMARIACEÆ, 300

LL. Fls. regular.....51. PORTULACACEÆ, 259

JJ. Sepals 3, 4 or 5: herbs and others.

K. Fr. elevated on a stipe or gynophore....66. CAPPARIDACEÆ, 301

KK. Fr. not so borne.

L. Lvs. compound.....56. RANUNCULACEÆ, 272

LL. Lvs. simple.

M. Arrangement of lvs. opposite.....109. CISTACEÆ, 506

MM. Arrangement alternate.

N. Fr. (in ours) a 2-valved spiny or muricate caps.....110. BIXACEÆ, 507

NN. Fr. baccate or drupaceous.

O. Shrubs or trees, erect.....112. FLACOURTIACEÆ, 509

OO. Shrubs climbing (in ours) ....105. DILLENIACEÆ, 499

HH. Ovary with 2 or more cells.

I. Sepals (and usually petals) imbricate.

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- J. Stamens commonly all distinct: placenta  
parietal.....112. FLACOURTIACEÆ, [509]
- JJ. Stamens mostly united at base or aggregated in bundles: placenta on the inner angles of the compartments as if axile...106. TERNSTROMIACEÆ, 500
- II. Sepals (and usually petals) valvate.
  - J. Anthers plainly 1-celled.
    - K. Ours herbs and shrubs.....102. MALVACEÆ, 483
    - KK. Ours a great tree.....103. BOMBACACEÆ, 496
  - JJ. Anthers 2-celled.
    - K. Usually stamens connate into tube....104. STERCULIACEÆ
    - KK. Usually stamens nearly or quite free and distinct.....101. TILIACEÆ, 481
- EE. Pistils few to many, distinct or united only at base.
  - F. Species of climbing plants.....56. RANUNCULACEÆ, [272]
  - FF. Species of erect herbs and shrubs.
    - G. Filaments of stamens united into a tube.....102. MALVACEÆ, 483
    - GG. Filaments not united.
      - H. Lvs. opposite.....60. CALYCANTHACEÆ, [292]
      - HH. Lvs. alternate.
        - I. Stamens inserted on calyx.....76. ROSACEÆ, 339
        - II. Stamens inserted on receptacle or disk.
          - J. Plants small, herbaceous.....68. RESEDACEÆ, 314
          - JJ. Plants, shrubs or trees.
            - K. Sepals and petals imbricated: fls. mostly showy.....59. MAGNOLIACEÆ, 289
            - KK. Sepals and petals valvate: fls. not showy. 61. ANNONACEÆ, 293
  - cc. Stamens definite, usually 5-10, or not more than twice as many as petals.
    - D. Calyx or its tube adherent to ovary, at least part way (ovary inferior; but cases in which the disk is more or less united to the ovary are to be sought in DD).
      - E. Cell or cells of ovary with only 1 ovule.
        - F. Stamens of same number as petals and opposite them.. 99. RHAMNACEÆ, 474
      - FF. Stamens not of same number as petals, or if of same number alternate with them.
        - G. Number of stamens 5 or 10.
          - H. Lvs. simple.....76. ROSACEÆ, 340
          - HH. Lvs. compound.
            - I. Fr. baccate.....128. ARALIACEÆ, 555
            - II. Fr. dry, splitting into carpels.....129. UMBELLIFERÆ, 559
        - GG. Number of stamens 2, 4, or 8.
          - H. Stigma and style 1: fr. small but fleshy.....130. CORNACEÆ, 567
          - HH. Stigmas (and often styles) more than 1 or else manifestly lobed: fr. not fleshy.
            - I. Plants herbaceous.
              - J. Style 1, and stigma 2-4-lobed.....126. ONAGRACEÆ, 546
              - JJ. Styles 2 or 4.....127. HALORAGIDACEÆ, [555]
            - II. Plants woody.....74. HAMAMELIDACEÆ, [338]
    - EE. Cell or cells with few or many ovules.
      - F. Ovary 1-celled.
        - G. Sepals or calyx-lobes 2.....51. PORTULACACEÆ, [259]
        - GG. Sepals or calyx-lobes more than 2.
          - H. Calyx projecting into a tube.....123. COMBRETACEÆ, [534]
          - HH. Calyx not so.....72. SAXIFRAGACEÆ, [325]
      - FF. Ovary with 2 or more cells.
        - G. Anthers opening at top by pores.....125. MELASTOMACEÆ, [543]
        - GG. Anthers opening otherwise, as by slits along the sides.
          - H. Stamens attached on conspicuous disk that sometimes covers and conceals the ovary.....92. CELASTRACEÆ, 463
          - HH. Stamens attached on calyx or calyx-tube.
            - I. Style 1.....126. ONAGRACEÆ, 546
            - II. Styles 2 or 3.....72. SAXIFRAGACEÆ, [325]
          - HHH. Stamens attached at very base of corolla and joined in a ring.....138. STYRACACEÆ, 590
    - DD. Calyx free from ovary or pistils (ovary or ovaries superior).
      - E. Pistils (separate ovaries) 2 or more, sometimes more or less united at base and then strongly lobed.
        - F. Stamens inserted on the calyx.
          - G. Plant fleshy, herbaceous or nearly so.....71. CRASSULACEÆ, 317
          - GG. Plant not fleshy, often woody.
            - H. Stipules 0.....72. SAXIFRAGACEÆ, [325]
            - HH. Stipules present.....76. ROSACEÆ, 340
        - FF. Stamens hypogynous (inserted on the receptacle beneath the ovary; seldom perigynous in Malpighiaceæ, 85).

# KEY TO THE FAMILIES

- g. Lvs. punctate with pellucid dots (seen when holding the lf. to the light)..... 82. **RUTACEÆ**, 440
- gg. Lvs. not so.
  - h. Plant fleshy, herbaceous..... 71. **CRASSULACEÆ**, 317
  - hh. Plant not fleshy, but herbaceous.
    - i. Ovaries with styles or stigmas separate..... 56. **RANUNCULACEÆ**, [272
    - ii. Ovaries separate, or joined into a lobed pistil, but with 1 common style.
      - j. Lobes of ovary 2 or 3..... 89. **LIMNANTHACEÆ**, [459
      - jj. Lobes of ovary 5..... 78. **GERANIACEÆ**, 433
  - hhh. Plant not fleshy, but woody.
    - i. Lvs. simple..... 85. **MAIPIGHIACEÆ**, [450
    - ii. Lvs. pinnate.
      - j. Lfts. not exceeding 5 or 7..... 56. **RANUNCULACEÆ**, [272
      - jj. Lfts. 11 or more: tree..... 83. **SIMARUBACEÆ**, 448
- ee. Pistil 1 (carpels perhaps more than 1, but joined into one body).
  - f. Ovary 1-celled.
    - g. Placenta 1 and ovary 1-ovuled but pistil compound as shown by number of styles or stigmas.
      - h. Plant herbaceous..... 67. **CRUCIFERÆ**, 302
      - hh. Plant woody..... 90. **ANACARDIACEÆ**, [459
    - gg. Placenta and stigma 1 (ovary simple).
      - h. Sepals 2 and petals 5, small: ours fleshy herbaceous twiners..... 52. **BASELLACEÆ**, 261
      - hh. Sepals and petals typically 5, and fls. usually showy: plants various.
        - i. Fr. a legume..... 77. **LEGUMINOSÆ**, 386
        - ii. Fr. a berry or caps..... 58. **BERBERIDACEÆ**, [286
    - ggg. Placentæ or stigmas, or both, or cells, more than 1 (ovary compound, of more than 1 carpel, even though 1-celled); ovules 2 or more.
      - h. Corolla very irregular.
        - i. Petals 4 and stamens 6..... 65. **FUMARIACEÆ**, 300
        - ii. Petals and stamens 5..... 111. **VIOLACEÆ**, 508
      - hh. Corolla nearly or quite regular.
        - i. Attachment of ovules (and seeds) not parietal (or on walls of ovary), i. e., axile or at bottom of ovary, or pendulous from the top.
          - j. Plants (ours) tendrill-climbers..... 100. **VITACEÆ**, 477
          - jj. Plants without tendrils.
            - k. Stamens not attached to corolla, or only at very base, not united into tube, few in number.
              - l. Insertion of stamens on rim or throat of calyx-tube..... 120. **LYTHRACEÆ**, 530
              - ll. Insertion of stamens not on top of calyx-tube, mostly hypogynous.
                - m. Lvs. opposite..... 53. **CARYOPHYLLACEÆ**, [261
                - mm. Lvs. alternate.
                  - n. Cells of ovary 3: foliage deciduous..... 131. **CLETHRACEÆ**, 569
                  - nn. Cells 3-10, mostly above 3: foliage evergreen..... 132. **ERICACEÆ**, 569
            - kk. Stamens attached on the corolla, as many as the corolla-lobes or more, sometimes monadelphous.
              - l. Styles 5..... 135. **PLUMBAGINACEÆ**, [586
              - ll. Style 1.
                - m. The stamens united at base..... 138. **STYRACACEÆ**, 590
                - mm. The stamens distinct..... 139. **OLEACEÆ**, 591
        - ii. Attachment of ovules parietal (on walls of ovary), in 2 or more placentæ.
          - j. Lvs. punctate with pellucid dots..... 107. **GUTTIFERÆ**, 502
          - jj. Lvs. not translucent-dotted, but beset with glandular hairs or bristles: little herbs.. 70 (note). **DROSERA-CEÆ**, 316
          - jjj. Lvs. otherwise and ordinary.
            - k. Stamens 10, of which 5 are perfect and inserted on margin of disk and 10 stam-inodia: small tree..... 69. **MORINGACEÆ**, 315
            - kk. Stamens 10, in 2 series, on throat of corolla..... 114. **CARICACEÆ**, 512
            - kkk. Stamens 6, of which 2 are short: herbs... 67. **CRUCIFERÆ**, 302
            - kkkk. Stamens otherwise.
              - l. Lvs. small and heath-like: small trees. 108. **TAMARICACEÆ**, [505
              - ll. Lvs. not heath-like.

# KEY TO THE FAMILIES

- m. Fr. (and ovary) stip'd in corolla.  
   N. Plants erect (in ours) ..... 66. CAPPARIDACEÆ, [301  
     NN. Plants climbing by tendrils....113. PASSIFLORACEÆ, [510  
 mm. Fr. (and ovary) not stipitate.  
   N. Stamens on outer edge of swollen  
     disk.....112. FLACOURTIACEÆ, [509  
   NN. Stamens otherwise.  
     o. And numerous.....109. CISTACEÆ, 506  
     oo. And as many as sepals or twice  
       as many..... 72. SAXIFRAGACEÆ, [325  
 ff. Ovary 2- or more-celled.  
   g. Corolla very irregular.  
   h. Anthers splitting on the side.  
     i. Lvs. pinnate..... 97. MELIANTHACEÆ, [472  
     ii. Lvs. digitate ..... 95. HIPPOCASTANA- [468  
     iii. Lvs. simple.  
       j. Calyx not tubular; 1 sepal long-spurred.  
         k. Carpels (cells) with 1 ovule..... 80. TROPÆOLACEÆ, [438  
           kk. Carpels with several ovules..... 98. BALSAMINACEÆ, [473  
         jj. Calyx tubular, somewhat saccate or merely  
           oblique at base.....120. LYTHRACEÆ, 530  
       hh. Anthers opening by terminal pores..... 86. POLYGALACEÆ, 451  
     gg. Corolla regular or essentially so.  
       h. Fr. a double samara..... 94. ACERACEÆ, 466  
       hh. Fr. a simple samara.....139. OLEACEÆ, 591  
     hhh. Fr. not a samara.  
       i. Petals 4; stamens 6, with 2 shorter..... 67. CRUCIFERÆ, 302  
       ii. Petals and stamens otherwise.  
         j. Fls. unisexual (monœcious or diœcious).  
           k. Juice milky ..... 87. EUPHORBIACEÆ, [451  
           kk. Juice not milky.....104. STERCULIACEÆ, [497  
         jj. Fls. bisexual and symmetrical.  
           k. Lvs. digitate.  
             l. Species herbaceous..... 79. OXALIDACEÆ, 437  
             ll. Species arboreous.....103. BOMBACACEÆ, 496  
         kk. Lvs. pinnate.  
           l. Plants herbaceous, not climbing.  
             m. Lf.-blade simply pinnate..... 89. LIMNANTHACEÆ, [459  
             mm. Lf.-blade 2-3-pinnate..... 72. SAXIFRAGACEÆ, [325  
             ll. Plants herbaceous, tendril-climbing.... 96. SAPINDACEÆ, 468  
           lll. Plants ligneous.  
             m. Fr. an inflated bladderly pod..... 93. STAPHYLEACEÆ, [465  
             mm. Fr. various.  
               n. Stigma 1, not lobed.  
               o. Ovary 3-5-lobed ..... 79. OXALIDACEÆ, 437  
               oo. Ovary entire ..... 84. MELIACEÆ, 448  
               nn. Stigma toothed, lobed or cleft.... 96. SAPINDACEÆ, 468  
         kkk. Lvs. simple, although perhaps lobed or  
           cleft.  
           l. Carpels separating from below and  
           joined above by styles: seeds not  
           arillate..... 78. GERANIACEÆ, 433  
           ll. Carpels dehiscing from above, and  
           seeds with an aril..... 92. CELASTRACEÆ, 463  
           lll. Carpels and seeds quite otherwise.  
           m. Lvs. opposite or verticillate.  
             n. Lf.-blade with punctate dots....107. GUTTIFERÆ, 502  
             nn. Lf.-blades without translucent  
             dots.  
               o. Calyx tubular or cup-like.  
               p. Petals hypogynous..... 53. CARYOPHYLLACEÆ, [261  
               pp. Petals on calyx.....120. LYTHRACEÆ, 530  
               oo. Calyx with parts distinct or  
               scarcely united at base... 85. MALPIGHIACEÆ, [450  
             mm. Lvs. alternate.  
               n. Fr. a small drupe: woody.... 91. AQUIFOLIACEÆ, [461  
               nn. Fr. capsular or somewhat baccate.  
               o. Stamens long-exserted and  
               prominent..... 97. MELIANTHACEÆ, [472  
               oo. Stamens included or essen-  
               tially so.

# KEY TO THE FAMILIES

- p. And in 1 whorl alternate with petals.  
q. Style 1..... 73. *PITTOSPORACEÆ*, [336  
qq. Styles 3-5..... 81. *LINACEÆ*, 439  
pp. And in usually 2 whorls, the fertile ones opposite petals..... 104. *STERCULIACEÆ*, 497
- Series II. GAMOPETALÆ (*Monopetalæ*):** corolla in 1 piece, the petals more or less united.
- a. Fls. unisexual (usually dioecious), the staminate fls. long-tubular with 10 stamens on the throat; sepals very small (pistillate fls. choripetalous)..... 114. *CARICACEÆ*, 512  
aa. Fls. quite otherwise.
- b. Position of ovary superior.
- c. Stamens not attached to corolla or only at its base, and not united into a tube.
- d. Stigmas 3: corolla nearly or quite polypetalous..... 131. *CLETHRACEÆ*, 569  
dd. Stigma capitate or peltate: corolla gamopetalous.
- e. Plant woody..... 132. *ERICACEÆ*, 569  
ee. Plant a prostrate herb..... 150. *NOLANACEÆ*, 652
- cc. Stamens borne on the corolla, twice or more as many as corolla-lobes, or if of same number as lobes then opposite them.
- d. Plant with long unbranched spiny sts., bearing lvs. but for a short time in summer..... 108. *TAMARICACEÆ*, (*Fouquieriaceæ*), 505  
dd. Plant of a wholly different character.
- e. Style 1.
- f. Species herbaceous..... 134. *PRIMULACEÆ*, 581  
ff. Species woody.
- g. Ovary 1-celled..... 133. *MYRSINACEÆ*, 580  
gg. Ovary 3-5-celled at base, 1-celled at top..... 138. *STYRACACEÆ*, 590  
ggg. Ovary 2- or more-celled throughout..... 136. *SAPOTACEÆ*, 588
- ee. Styles 2 or more.
- f. Fr. dry, an achene or utricle..... 135. *PLUMBAGINACEÆ*, [586  
ff. Fr. fleshy, baccate or drupe-like..... 137. *EBENACEÆ*, 590
- ccc. Stamens borne on the corolla, not more in number than the lobes of the corolla and alternate with them.
- d. Ovaries 2 and distinct, each 1-celled.
- e. Stamens distinct but styles united..... 142. *APOCYNACEÆ*, 601  
ee. Stamens usually united but styles distinct..... 143. *ASCLEPIADACEÆ*, [606
- dd. Ovary 1 and 1-celled.
- e. Style 1.
- f. Stamens as many as lobes of corolla..... 141. *GENTIANACEÆ*, [600  
ff. Stamens fewer, 2 or 4, the 5th one often represented by scale or staminode..... 156. *GESNERIACEÆ*, 692
- ee. Styles 2..... 146. *HYDROPHYLLACEÆ*, [620
- ddd. Ovary deeply lobed around the style, the parts separating as nutlets.
- e. Lvs. (at least the main ones) alternate..... 147. *BORAGINACEÆ*, 622  
ee. Lvs. opposite..... 149. *LABIATÆ*, 634
- dddd. Ovary 1 but compound (2- or more-celled, or with 2 or more parietal placentæ).
- e. Fr. of 4 little nutlets.
- f. Lvs. alternate..... 147. *BORAGINACEÆ*, 622  
ff. Lvs. opposite..... 148. *VERBENACEÆ*, 627
- ee. Fr. very large, with 2 long proboscis-like beaks..... 155. *MARTYNIACEÆ*, [692
- eee. Fr. other than in e and ee.
- f. Number of stamens fewer than lobes of corolla, usually 2 or 4.
- g. Lvs. opposite or the upper alternate.
- h. Plant herbaceous..... 154. *PEDALIACEÆ*, 691  
hh. Plant woody.
- i. The stamens mostly 2, not didynamous..... 139. *OLEACEÆ*, 591  
ii. The stamens mostly 4, didynamous or paired.
- j. Ovules 2 or more in each cell..... 158. *ACANTHACEÆ*, 697  
jj. Ovule 1 in each cell..... 159. *MYOPORACEÆ*, 707
- gg. Lvs. alternate or the upper sometimes opposite.
- h. Fr. drupaceous..... 159. *MYOPORACEÆ*, 707  
hh. Fr. a berry or a caps..... 151. *SOLANACEÆ*, 652
- hhh. Fr. small, indehiscent and nutlet-like, included in the calyx..... 157. *GLOBULARIACEÆ*, [697
- ff. Number of stamens same as lobes or lips of corolla.
- g. Cells of ovary and stigmas 3..... 145. *POLEMONIACEÆ*, [614  
gg. Cells usually 2, sometimes more but not 3 unless by abortion.



# KEY TO THE FAMILIES

- H. Ovules erect from the base of the cell, usually 2..144. CONVULVULACEÆ,
- HH. Ovules on axile placenta. [609]
  - I. Caps. completely 2-celled, often woody, elastic-ally dehiscent loculicidally: lvs. opposite....158. ACANTHACEÆ, 697
  - II. Caps. otherwise, not elastically dehiscent.
    - J. Stipules present, sometimes represented by a line joining opposite lvs.....140. LOGANIACEÆ, 598
    - JJ. Stipules wanting.
      - K. Corolla-lobes valvate or plicate in bud: fls. for the most part regular or nearly so: lvs. alternate.....151. SOLANACEÆ, 652
      - KK. Corolla-lobes imbricate: fls. mostly very irregular (exception in Verbascum and Celsia): lvs. alternate or opposite.....152. SCROPHULARI-ACEÆ, 669
- HHH. Ovules on parietal placenta: mostly woody plants.....153. BIGNONIACEÆ, 683
- BB. Position of ovary inferior.
  - c. Herbs bearing tendrils.....164. CUCURBITACEÆ, [733]
  - cc. Herbs and woody plants without tendrils.
    - d. Anthers separate.
      - e. All stamens inserted on the corolla, either at the throat or farther down on the tube or at base.
        - f. Stamens fewer than lobes of corolla.
          - g. The number 2 or 4, the 5th represented by scale or staminode: ovary 1-celled and many-ovuled....156. GESNERIACEÆ, 692
          - gg. The number 1-3: ovary 3-celled, 2 cells abortive..162. VALERIANACEÆ, [729]
        - ff. Stamens as many as lobes of corolla, or more.
          - g. The number 8-16.....138. STYRACACEÆ, 590
          - gg. The number 4 or 5: lvs. opposite or verticillate.
            - h. Ovary 1-celled and 1-ovuled: fls. in dense heads..163. DIPSACEÆ, 731
            - hh. Ovary 2-5 celled.
              - i. Lvs. stipulate (or a stipular line joining op-posite lvs.) or whorled.....160. RUBIACEÆ, 708
              - ii. Lvs. exstipulate, never whorled.....161. CAPRIFOLIACEÆ, [716]
      - eee. All stamens free from corolla or essentially so, as many as the lobes: herbs with milky juice .....165. CAMPANULACEÆ, [740]
    - DD. Anthers united in a tube about the style.
      - e. Fls. not capitate; corolla irregular; some or all the anthers bearded at top.....166. LOBELIACEÆ, 745
      - ee. Fls. in a close involucre head; corolla regular or irregu-lar; anthers not bearded at top.....167. COMPOSITÆ, 748



FIG. 4. PTERIDOPHYTA.

*A*, *Nephrolepis exaltata*, pinna; *Aa*, sori, showing indusium and sporangia. *B*, *Polystichum aculeatum*; *Bb*, sporangium. *C*, *Selaginella caulescens*, fruiting spike; *Cc*, macrospores; microspores are under other sporophylls in the same spike. *D*, *Cibotium Schiedei*; *Dd*, detached indusium with sporangia. *E*, *Alsophila australis*, segment; *Ee*, sori; *Eee*, sporangium. *F*, *Adiantum Capillus-Veneris*, showing two indusia; *Ff*, an indusium lifted up, and a separate sporangium. *G*, *Lygodium japonicum*, fruiting spike; *Gg*, a sporangium, showing dehiscence at tip.

# THALLOPHYTA AND PTERIDOPHYTA

## 1. AGARICACEÆ. AGARIC FAMILY

One of the mushroom families: mostly saprophytic: pileus or cap usually on a stipe which is sometimes provided with an annulus or circular scarf (which sometimes disappears with age): hymenium or fruiting surface on the under side of the pileus and consisting of gills or radiating plates; basidium (body that bears the spores) continuous, not forked or divided, bearing 4 or rarely 2 spores: fleshy fungi, not gelatinous, of many genera, widely distributed. Some of them are poisonous, and mushrooms for eating should be taken only when pronounced safe by experts. In some genera the young plant is enveloped in a "universal veil" or volva, but what is known as "the veil" is a web-like or membranous structure extending in the young plant from the under edge of the pileus to the stipe and covering the gills.

**AGARICUS**, L. Plants of the familiar mushroom form, terrestrial, the stipe or st. bearing an annulus (sometimes disappearing) but volva absent: gills not attached to the stipe and the pileus readily detached: spores purple-brown or blackish at maturity. (Agar-icus: probably from *Agari*, an ancient district in Sarmatia, now in Poland.)—About 100 species are described.

Stipe solid: gills opening pink..... 1. *A. campestris*  
Stipe hollow: gills opening white..... 2. *A. subrufescens*

1. ***A. campestris***, L. COMMON MUSHROOM. Plant produced in clusters, at maturity 2-4 or 5 in. high: stipe or st. nearly cylindrical, white, solid; annulus above the middle, soon shriveling, nearly or quite disappearing: pileus rounded, becoming convex and broadening with age, 2-5 in. across, surface mostly white but sometimes brown, often scaly, the flesh white; gills at first pink and becoming nearly black, bearing many spores; veil very thin and frail, white.—Frequent in pastures and other fields and by roadsides: cult. in specially prepared beds. More than one species is likely to be involved in plants grown from pasture spawn.

2. ***A. subrufescens***, Peck. Stipe hollow below the annulus, white, somewhat thickened or bulbous; annulus membranaceous, white, flocculose: pileus 2 4 in. and more broad, deeply hemispherical at first but becoming convex and expanded, whitish to grayish and dull reddish-brown; gills at first white, then pinkish and at length blackish-brown.—Sometimes cult.; probably the same as European *A. fabaceus*, Berk.

## 2. SCHIZÆACEÆ. SCHIZEA-FERN FAMILY

A small family of ferns of wide distribution, mostly trop., those of the genus *Lygodium* climbing and some of them cult. under glass for ornament; there are 4 commonly recognized genera and more than 100 species; the little localized native curly-grass fern, ***Schizæa pusilla***, Pursh, which has none of the look of the common ferns, occurs on the coastal region Newf. to N. J.; the sporangia are borne in special spikes or panicles distinct from the other foliage or else on narrowed specialized segms. among the usual foliage: for certain technical characters, see the key, page 48. *G*, *Gg*, Fig. 4.

**LYGODIUM**, Sw. CLIMBING FERN. Twenty to 30 species, mainly trop.—Fronds radical, long and slender, the rachis twining and simulating a st.: the "lvs." are secondary pinnæ, which are palmately or pinnately compound or decompound; the stalk or petiole of the pinnæ branches near its base, bearing a pinnule on either fork, or sometimes the fork is so near the rachis that the petiolule practically disappears and is unobserved: sporangia single

under scale-like imbricated indusia, borne on narrowed divisions of the pinnules, which sometimes lose their foliar character and become wholly specialized fruiting panicles, and which in other species become strongly toothed or pinnate from the contraction of the margins. (*Lygodium*: Greek *flexible*.)—*L. palmatum*, Sw., often called the "Hartford fern," is native in E. N. Amer., and is sometimes transferred to grounds. The names of the glasshouse lygodiums seem to be confused in cult.; *L. japonicum* is the usual species, often grown under other names. Lvs. of lygodiums are frequently several ft. long, as if they were slender sts.

Sterile pinnules palmately lobed, or forked..... 1. *L. circinatum*  
Sterile pinnules pinnate or pinnately lobed.

Segms. not pinnate and usually not lobed.

All segms. long-lanceolate, usually several in. long..... 2. *L. volubile*

All segms. usually ovate to long-ovate..... 3. *L. scandens*

Segms. prominently pinnate or lobed..... 4. *L. japonicum*

1. *L. circinatum*, Sw. (*L. dichotomum*, Sw.). Robust, tall, with long-persistent foliage: common stalk or petiolule nearly obsolete; secondary petiolule 1-2 in.: pinnules large, bright green, palmately divided nearly to the base, the segms. 4-12 in. long and entire: sporangia in short marginal spikes on very narrow segms. Trop. Asia, Malaya.

2. *L. volubile*, Sw. Common petiolule obsolete; secondary 1-2 in. long: pinnules pinnate, with alternate minutely serrate long-lanceolate segms. 4-12 in. long that are jointed to the short stalks: sporangia in rows of short marginal spikes, the fertile segms. not much contracted. Trop. Amer.—Likely to be confused with No. 1.

3. *L. scandens*, Sw. Slender, somewhat bushy, the foliage bluish-green: common petiolule evident but short; secondary about 1 in.: pinnules pinnate, the segms. 1-2 in. long, ovate to ovate-lanceolate, standing at right angles, truncate or cordate at base and sometimes obscurely lobed, jointed on the very short stalks: sporangia in short spikes around the margin of short broad segms. E. Asia.

4. *L. japonicum*, Sw. Slender elegant plant with much-divided soft pale green foliage: common petiolule short; secondary 1 in. or less: pinnules pinnate, the alternate or opposite short-stalked non-jointed segms. pinnatifid or even pinnate or some of them only deeply lobed at base, margins variously dentate: sporangia in short spikes on the margins of broad segms. E. Indies, E. Asia, Australia.—Foliage on young or undeveloped plants much smaller with finer divisions.

### 3. CYATHEACEÆ. TREE-FERN FAMILY

Trop. and subtrop. ferns, in many parts of the globe, usually with a distinct caudex or trunk which often attains several to many ft. in length but which is sometimes decumbent; genera at least 7, species about 300; a very few species are rather common in choice glasshouse collections.—The family differs from the Polypodiaceæ in minute technical characters, the annulus or ring of the sporangium oblique and uninterrupted or continuous because it passes by the insertion of the pedicel: sori on the back or margins of the fronds, which are on the pinnate order.—Plants are sometimes grown only in the juvenile stage, being discarded before the trunk develops. The blechnums, some of which develop a trunk, are Polypodiaceous; they have the fructification extending along the midrib. *D*, *Dd*, *E*, *Ee*, *Eee*, Fig. 4.

Sori on the ends of the fertile veinlets, therefore marginal.

Outer valve of indusium apparently formed of the incurved little modified segm.-tooth..... 1. *DICKSONIA*

Outer indusium valve free from the normal frond margin..... 2. *CIBOTIUM*

Sori near the middle or at the forks of the veinlets, therefore midway of the midrib and the margin.

Fruit-dot or sorus provided with an indusium which at first covers it.. 3. *CYATHEA*

Fruit-dot naked..... 4. *ALSOPHILA*

1. *DICKSONIA*, L'Her. Handsome tree-ferns, the trunk in some species very short but usually rising several ft. (or in nature 30 ft. and more); species

a dozen or more, mostly in the southern hemisphere, trop. and subtrop.—Trunk usually more fibrous in structure than many other tree-ferns: fronds large, 2–3-pinnate, the stipes smooth or sometimes slightly prickly, pinnæ ovate to long-lanceolate: sori at the margin at the tip of a veinlet and borne on an elevated receptacle, covered by 2-valved indusia of which the upper valve is continuous with the segm.-tooth. (Dicksonia: James Dickson, 1738–1822, English seedsman and cryptogamic botanist.)—The native *D. punctilobula* is now placed in the genus *Dennstaedtia*, one of the Polypodiaceæ.

**D. antarctica**, Labill. One of the common tree-ferns in cult., making a stout trunk, in its native country 20–35 ft., the head symmetrical and attractive: fronds very large (often 6 ft. long), rhomboid or deltoid, 3-pinnate; stipes short, with dark brown scales; pinnules distinct, numerous, 20–30 pairs, alternate and close together, sessile, long-lanceolate-acute, 1–2 in. long, with many acute serrulate segms., some of which bear the sori incurved on the under margin. Australia.

**2. CIBOTIUM**, Kaulf. Stout tree-ferns but sometimes grown only as young plants; about 8 species in Cent. Amer., Mex., and Polynesia; trunks in some species very woolly.—Fronds mostly 3-pinnate, the pinnules usually with linear or lanceolate segms.: sori at tips of veinlets, the indusia 2-valved of which the outer valve is distinct from the margin of the segm. (*Cibotium*: Greek a little seed-vessel.)

**C. Schiedeii**, Schlecht. & Cham. Handsome and popular tree-fern, trunk to 15 ft.: fronds very large, 5–10 ft., oblong-triangular in outline, gracefully drooping, 3-pinnate; stipes short and stout, brown, hairy; pinnules many, 25 or more pairs, opposite or subopposite, separated, very short-stalked, long and narrow, pointed, 4–8 in. long, glaucous-gray beneath, with many obtusely serrate segms. of which the margin is not incurved to form part of the indusium. (Bears the name of Christian J. W. Schiede, German botanist who traveled in Mex.; died 1836.) Mex., Guatemala.

**3. CYATHEA**, Sm. Tall tree-ferns, the trunk sometimes more than 50 ft. in height; species more than 100, trop. and subtrop., both eastern and western hemispheres.—Fronds very large and attractive, in the cult. species 2–3-pinnate, the stipes frequently somewhat prickly: sori on the back of the segm. rather than at its margin, on an elevated receptacle; indusium covering the young sorus but soon splitting at the top and remaining as a cup or fringe around the fruit-dot. (*Cyathæa*: Greek cup, referring to the indusia.)

**C. dealbata**, Sw. Stout fern, the trunk in nativity becoming 30 ft. and more tall and 18 in. diam.: fronds spreading horizontally, 5–12 ft. long, 2–4 ft. broad, 2–3-pinnate, yellowish-green above and powdery white beneath making a striking foliage; young plants green, the white appearing irregularly; stipes slender, scaly at base; rachides woolly-scaly when young; pinnæ 10–18 in. long; pinnules 2–4 in. long, long-lanceolate, bearing many nearly entire segms., the brown sori conspicuous on the colored lower surface. New Zeal., Lord Howe Isls.

**4. ALSOPHILA**, R. Br. Tree-ferns as known in cult., but in some species the trunk is very short or even almost wanting, sometimes prostrate; species more than 100, mostly trop., in Amer. and the eastern hemisphere.—Fronds large, 2–3-pinnate in the cult. kinds; stipes smooth, scaly or even spiny: sori on the back of the segm., more or less elevated, naked (without indusium), in this respect differing from *Cyathea*. (*Alsophila*: Greek grove-loving.)

**A. australis**, R. Br. Trunk straight, 20 ft. or more, not very thick, with a spreading head of 2–3-pinnate fronds 5–12 ft. long, light green above and somewhat bluish beneath: stipe and rachis rough and more or less chaffy, the stipe 12–18 in. long; pinnæ about 18 in. long and 6–10 in. broad; pinnules 3–6 in. long and about 1 in. broad at base, long-pointed, the curved segms. serrate and bearing the naked sori between margin and rib. Australia.



# POLYPODIACEÆ

## 4. POLYPODIACEÆ. COMMON-FERN FAMILY

Mostly low plants lacking a distinct caudex or trunk, of widely differing habits and structure, with mostly creeping rhizomes, numbering three-fourths of all ferns, distributed all over the world, perhaps 5,000 species, many of them familiar glasshouse subjects.—Fronds coiled in veneration, usually once or more pinnate but sometimes simple and entire: sporangia associated in sori or fruit-dots of many sizes and shapes, borne on the backs or at the margins of the fronds, in most genera covered with an indusium, the spores discharged by an anterior transverse rupture.—Many of the species are remarkably variable, and run into forms that may not be recognized as belonging to the parent species. Any number of the native ferns may be transferred to grounds and offered by dealers in native plants. *A, Aa, B, Bb, F, Ff*, Fig. 4.

- a. Indusium none (in species herein), or so rudimentary as not to be evident.
- b. Sporangia in definite circular or elongated sori.
  - c. Fronds entire, divided or compound: sori usually distinctly separated: veins free or anastomosing (running into each other). (*Dryopteris*, 14, may be sought here).
  - d. Under surface smooth, sometimes scurfy or scaly, but not stellate-hairy or powdery..... 1. POLYPODIUM
  - dd. Under surface usually covered with white or yellow powder. .... 2. PITYROGRAMMA
  - cc. Fronds entire or at least undivided; under surface densely clothed with stellate hairs and mostly with the numerous sori contiguous, the veins reticulating or running into each other..... 3. CYCLOPHORUS
  - bb. Sporangia scattered or in large continuous areas, not in definite sori or dots.
    - c. Fronds of two kinds, the early sterile ones shield-like or thal-  
lus-like, persistent; fertile fronds lobed..... 4. PLATYCERIUM
    - cc. Fronds simple, not of two kinds or descriptions although the  
fertile may be smaller..... 5. ELAPHOGLOSSUM
- aa. Indusium present and evident (at least before dehiscence; exception  
in some species of *Dryopteris*).
- b. Sori at the edge of the frond or segm., the reflexed margin forming  
an indusium. (*Odontosoria* and *Dennstaedtia*, 19 and 20, are  
not to be sought here.)
  - c. Fertile segms. not much wider than the sori, the indusium-  
valves arising from either side..... 6. ONYCHIMUM
  - cc. Fertile segms. broad, the sori on the edge.
    - d. All sori (indusia) remaining separate and distinct..... 7. ADIANTUM
    - dd. All sori soon forming a continuous line underneath the  
margin.
      - e. Fronds small, 1-2-pinnate; pinnae short and broad..... 8. PELLÆA
      - ee. Fronds mostly larger and more divided, often more than  
2-pinnate; pinnae much elongated..... 9. PTERIS
  - bb. Sori variously placed on the back of the frond, but not on the edge  
with a marginal reflexed indusium.
    - c. Shape of sori linear or oblong, twice or more as long as broad,  
straight or curved.
      - d. Position of sori parallel to midrib..... 10. BLECHNUM
      - dd. Position oblique or transverse to the midrib.
        - e. Valves of indusia 2, due to the confluence of 2 sori, open-  
ing from the middle outward..... 11. PHYLLITIS
        - ee. Valve single, the dehiscence toward the apex of the frond  
or segm.
          - f. The sori curved or recurved, usually crossing the vein-  
let..... 12. ATHYRIUM
          - ff. The sori straight or only slightly curved, attached to  
upper side of veinlet..... 13. ASPLENIUM
    - cc. Shape of sori circular, or at least less than twice as broad as  
long.
      - d. The indusium spread over the sorus, covering it (superior),  
usually not on the margin of the frond.
        - e. Attachment of the cordate or reniform indusium at the  
sinus (sometimes wanting)..... 14. DRYOPTERIS
        - ee. Attachment peltate, by a central stalk; indusium orbicu-  
lar.
          - f. Veinlets free, running directly out to the margin of the  
frond, often forking..... 15. POLYSTICHUM
          - ff. Veinlets anastomosing or running together, forming  
a reticulated structure..... 16. CYRTOMIUM

- DD. The indusium attached under the sorus (inferior), opening at the top or side, often marginal.  
 E. Attachment of indusium (which is circular or reniform) only at base; pinnae jointed to the rachis.....17. *NEPHROLEPIS*  
 EE. Attachment of indusium at both base and sides; pinnae not jointed.  
 F. Shape of indusium tubular, attachment often at margin of frond.....18. *DAVALLIA*  
 FF. Shape of indusium scale-like, at end of segm., opening at top.....19. *ODONTOSORIA*  
 FFF. Shape cup-like.....20. *DENNSTAEDTIA*

1. **POLYPODIUM**, L. **POLYPODY**. Several hundred species in trop. and subtrop. regions and a few in temp. climates, widely distributed and of various habit; most of them are terrestrial, but some are epiphytes on trees.—Rhizome usually prominent, to which the stipes are jointed, a scar remaining after detachment: sori circular, naked, centrally placed on the back of the frond: veins either free (not running into each other) and extending directly to the margin, or variously anastomosing and forming areoles (small spaces between). (Polypo-dium: Greek *many feet*, alluding to the branching rhizome.)—Of this large genus but few species are in common cult., and none of them is among the first dozen of hort. ferns.

- Veins free: plant about 1 ft. or less tall, hardy..... 1. *P. vulgare*  
 Veins reticulated: plant 2-3 ft., tender, grown under glass.  
 Venation direct, the veinlets in the areoles (spaces between veins) extending outward toward the margin of the frond..... 2. *P. aureum*  
 Venation indirect, the veinlets irregular or indifferent in position.... 3. *P. Phymatodes*

1. **P. vulgare**, L. **COMMON POLYPODY**. **WALL FERN**. Low, forming mats, commonly 6-15 in. tall, the stipe about one-third the length of the oblong smooth green blade which is deeply pinnatifid; segms. narrow-oblong, often curved, obtuse or semi-acute: sori numerous and large, in a row on either side the midrib. On rocks, banks and trees, Eurasia and W. N. Amer.—There are many forms, dissected, crested and plumed, and these are sometimes in cult. in collections of hardy ferns. The hort. vars. belong probably to the true *P. vulgare* rather than to *P. virginianum*, L., of E. N. Amer., inasmuch as it is the more variable species. *P. vulgare* is the larger species; lowest pinnae commonly shorter than the middle ones (usually equaling or exceeding them in *P. virginianum*), midribs curving rather than straight, sori usually median rather than nearly marginal; rhizome sweet, not so in *P. virginianum*.

2. **P. aureum**, L. (*P. glaucum*, Hort. *Phlebodium aureum*, J. Sm. *Chrysopteris glauca*, Fée). **HARES-FOOT FERN**. Stout coarse fern with thick densely coarsely brown-sealy rhizomes on the surface of the pot or tree (often epiphytic) from which arise a few fronds 2-4 ft. tall: stipe very long; lamina broadly oblong in outline, 1 ft. and more broad, green or densely glaucous-blue, deeply pinnatifid with obtuse sutures, often completely pinnate on the lower half; pinnae or lobes 6-12 in. long and 1-2 in. wide, with parallel sides, acuminate, the margins wavy: sori large and prominent: veins not free or nearly so. Trop. Amer.—Widely variable, especially in cult.; the very glaucous forms, often originating from spores of the green-leaved, are mostly known as *P. glaucum* and *glaucophyllum*, Hort. There are crested and lacinate forms, one of which (a spore sport) is known as *P. Mandaianum* (introduced by W. A. Manda, N. J.).

3. **P. Phymatodes**, L. (*Phymatodes vulgaris*, Presl. *Drynaria vulgaris*, J. Sm.). An oriental representative of No. 2, with slender brown-black sealy rhizome and smaller fronds: sori less immersed and not so showy as in No. 2, often leaving holes in the long narrow pinnae: veins not prominent, anastomosing. (Phymatodes: Greek *close network*; an old generic name.) Asia, Afr.

2. **PITYROGRAMMA**, Link. **GOLD and SILVER FERNS**. Probably 10 to 12 species, as now defined, trop., mostly American, one of which is common in greenhouses.—Fronds mostly 2-pinnate, tufted, with copious white or yellow powder on the under side: sori linear, nearly confluent along the veins on the back of the frond: no indusia. (Pityrogramma: Greek *bran-line*,

alluding to the powder.)—The following species were formerly called *Gymnogramma* and later *Ceropteris*.

|   |                          |
|---|--------------------------|
| Segms. of pinnae rounded or obtuse..... | 1. <i>P. tartarea</i>    |
| Segms. distinctly acute or acutish..... | 2. <i>P. calomelanos</i> |

1. *P. tartarea*, Maxon (*Gymnogramma tartarea*, Desv. *Ceropteris tartarea*, Link.). Fronds broad-lanceolate to oblong-lanceolate to deltoid-lanceolate in outline, 6 in.–2 ft. long, powdery white beneath, pinnate and the pinnae (which are 2–6 in. long and not long-pointed, entire or nearly so) pinnatifid; stipes shining; segms. close together, obtuse or sometimes a minute point on a rounded end. Trop. Amer.—One of the silver-ferns, but less common in cult. than No. 2; a gold var. is recorded.

2. *P. calomelanos*, Link (*Gymnogramma calomelanos*, Kaulf. *Ceropteris calomelanos*, Underw.). SILVER FERN. Attractive and popular greenhouse fern: fronds long-lanceolate to narrowly ovate-lanceolate in outline, 1–3 ft. long, powdery white beneath, the long (3–12 in.) and mostly long-acuminate pinnae again pinnate; stipes handsome shining black; segms. or pinnules acute or short-acute for the most part, sometimes pinnatifid at the base. (*Calomelanos*: Greek *beautiful black*.) Trop. Amer.—Var. *aureo-flava*, Weatherby (*Gymnogramma chrysophyllum*, Kaulf. *Ceropteris chrysophylla*, Link), GOLD FERN, has gold-colored powder.

3. **CYCLOPHORUS**, Desv. As now defined, the genus comprises some 75 species, mostly in E. Asia, E. Indies, S. Afr., to New Zeal. and Australia; often included in *Polypodium*.—Rhizome scaly or hairy, creeping, slender or stout: fronds normally simple and entire, tomentose on the back with stellate hairs, leathery in texture and with a fine scarcely evident network of veins: sori circular, without indusia, often so close together as to cover the back of the frond. (*Cyclophorus*: Greek *circle-bearing*, referring to the sori.)

C. *Lingua*, Desv. (*Niphobolus Lingua*, Spreng. *Polypodium Lingua*, Sw.). TONGUE FERN. Fronds many, erect, from a slender rhizome, 6–15 in. long of which the stout stipe comprises from one-fourth to more than one-half; blade entire, lanceolate to oblong- or ovate-lanceolate, more or less acuminate, rusty beneath: sori contiguous, more or less rowed. (*Lingua*: Latin *the tongue*; used here as a substantive in apposition.) China, Japan, and southward.—Var. *corymbiferus*, Benedict, has the fronds forked at the apex; a hort. state. There is also a variegated kind.

4. **PLATYCERIUM**, Desv. (*Alcicornium*, Gaud.). STAGHORN FERN. A dozen or more striking epiphytic ferns, trop. Afr. and Asia to temp. Australia, some of which are frequently seen in public conservatories and fine collections.—Fronds of two kinds—usually flat rounded shield-shaped or dish-shaped parchment-like entire sterile lvs. (like a great thallus) that lie close to the support on which they grow, and erect or spreading mostly antler-forked fertile lvs.: sori naked, united to form great dense patches on the under side of the frond, mostly at or toward the end of the antlers. (*Platyserium*: Greek *broad-horn*.)—In some species the sterile fronds are also forked, as in *P. grande*, J. Sm., from Malaysia and trop. Australia, with the fertile fronds in pairs and the plant glabrous or nearly so, *P. Wallichii*, Hook., of Malaya, with the plant yellow-woolly or pubescent and fertile fronds in pairs, and *P. Willinckii*, Moore, Java, with fertile fronds in 3's, all the parts being narrow; these species are not common in cult.

|   |                         |
|---|-------------------------|
| Under surface of fertile frond densely white-tomentose: tips wide-spreading, short..... | 1. <i>P. Stemaria</i>   |
| Under surface green or whitish-pubescent: tips nearly or quite erect, long.             |                         |
| Foliage dark green, upright.....  | 2. <i>P. Hillii</i>     |
| Foliage gray or gray-green, drooping.....   | 3. <i>P. bifurcatum</i> |

1. *P. Stemaria*, Desv. (*P. æthiopicum*, Hook.). Sterile fronds rounded and convex, somewhat lobed; fertile fronds pendent or declined, twice forked, white-tomentose beneath, the tips short and divaricate: fructification a V-shaped patch under the sinus and extending part way on the forks. (*Stemaria*, *Stemmaria*: Latin *garlands*.) W. trop. Afr.

2. *P. Hillii*, Moore. Plant deep green, more or less stellate-pubescent beneath when young: sterile fronds rounded, convex; fertile fronds erect or strongly ascending, repeatedly forked,  $\frac{1}{2}$  ft. long: fructification on the ultimate segms. above the sinus and not extending to the tips. (Named for W. Hill, from whom Veitch & Sons received the plant.) Australia.

3. *P. bifurcatum*, C. Chr. (*P. alaicorne*, Desv.). COMMON STAGHORN FERN. Plant grayish-green, more or less cottony- or silky-pubescent: sterile fronds rounded and convex, the margin undulate and sometimes lobed; fertile fronds clustered, pendent, 2-3 ft. long, forked into narrow segms: fructification on the ends of the forking segms., usually beginning beneath the terminal sinus and extending to the tips. Australia.—Var. *majus*, Weatherby, is a larger and greener plant from Polynesia, with thick leathery more erect fronds.

5. *ELAPHOGLOSSUM*, Schott. Simple-fronded ferns of the tropics of both hemispheres, 250-300 in number, very few of which are cult. and only one at all common.—Fronds erect from creeping rhizomes, usually firm or thick in texture: sporangia covering the under surface of the fertile frond, which may be narrower and smaller than the sterile: veins either free or anastomosing (netted), commonly the former. (*Elaphoglossum*: Greek *deer tongue*.)

*E. crinitum*, Christ (*Acrostichum crinitum*, L. *Chrysodium crinitum*, Mett. *Hymenodium crinitum*, Fée). ELEPHANT-EAR FERN. Fronds thick, 1-2 ft. long, one-fourth or one-third of which is the conspicuous shaggy-hairy stout stipe; lamina entire, oblong to paddle-shaped, 6-8 in. broad at maturity, blunt or very short-acute, base rounded or subcordate, with scattered long hairs below and on the edge and sometimes on the upper surface: sporangia making a felt-like covering on the lower surface of the fertile blades. W. Indies, Mex., Cent. Amer.

6. *ONYCHIUM*, Kaulf. About a half-dozen little ferns of Asia, Afr., Cent. trop. Amer., one of which is commonly grown for its finely cut graceful foliage.—Sori at the tips of narrow pointed segms., mounted on a narrow receptacle, the indusia opening on the inner side next the midrib: fronds 3-4-pinnate. (*Onychium*: from Greek for *claw*, referring to the shape of the lobes or segms.)

*O. japonicum*, Kunze. Fronds many, smooth, erect or ascending 1-1½ ft., thin and fragile, light green, oblong-ovate in outline, 3-4-pinnate, the ultimate pinnules ovate or oblong,  $\frac{1}{2}$  in. or less long and pinnatifid, the segms. again toothed, making a very fine or small division: stipe slender, straw-colored: indusia pale brown, nearly as wide as the almost linear mucronate segm., the fertile and sterile fronds much alike. Himalaya to Java and Japan.

7. *ADIANTUM*, L. MAIDENHAIR FERN. Small thin-leaved delicate ferns making broad dense pot specimens with many slender wiry usually shining stipes; species 100 to 200, mostly of shaded habitats, largely of trop. Amer., a few in temp. N. Amer.—Sori at or near the ends of free-forking veins on the edge of the frond and covered by specialized reflexed tips of the margin which form an indusium, often at the bottom of a sinus: fronds pinnately or pedately compound or decompound, the pinnules broad, variously oblong, cuneate, rhomboid or trapeziform: rhizomes horizontal, forming a mat. (*Adiantum*: Greek *unwetted*, alluding to the shedding of the rain by the character of foliage and growth. Vernacular name from the graceful locks or tresses.)

Indusia distinctly oblong or sausage-shaped, little or not at all curved, conspicuously formed of the reflexed margins.

Pinnules prevailingly small, most of them about  $\frac{1}{2}$  in. across and often less.....

Pinnules mostly larger, the main ones usually as much as  $\frac{3}{4}$  in. across and often much broader.....

Margins of pinnules lobed but not lacinate or deeply cut; pinnules of medium size.....

Margins deeply cut; pinnules usually  $1\frac{1}{4}$  in. or more broad ..

Indusia circular, reniform or horseshoe-shaped, not so evidently formed of the frond-margin, the sinus often very prominent.

Foliage thin: fronds broad, deltoid-ovate.....

Foliage firm: fronds narrow, oblong or ovate-oblong.....

1. *A. Capillus-Veneris*

2. *A. tenerum*

2. Var. *Farleyense*

3. *A. cuneatum*

4. *A. decorum*



1. **A. Capillus-Veneris**, L. VENUSHAIR. TRUE OR BLACK MAIDENHAIR. Slender erect-spreading fern, 12-18 in. high, with slender chaffy-hairy rhizome and thin brown-black stipes: lamina ovate to oblong-ovate, often curved, mostly 6-12 in. long, 2-3-pinnate except toward the top; pinnules lively green, stalked, cuneate-rhomboid, notched,  $\frac{1}{4}$ -1 in. across, the 1-5 prominent indusia transverse and straight or somewhat curved. (Capillus-Veneris: Latin *hair of Venus*.)—Variable in nature and in cult.; temp. and trop. Amer., warmer parts of the Old World; frequent in greenhouses. Several Latin-named forms are referable to this species and its derivatives. Var. **daphnites**, Moore, has simpler fronds with very broad semi-cristate pinnules.

2. **A. tenerum**, Sw. BRITTLE MAIDENHAIR. Strong erect plant,  $1\frac{1}{2}$ -3 ft. and more, with stout glossy black-brown stipes: lamina very broad, usually more or less deltoid, about as broad as long, 3-pinnate; pinnules dull green, stalked, usually falling with age, rhombic to cuneate-ovate or cuneate-orbicular, mostly  $\frac{3}{4}$  in. and more across, notched or almost cut, bearing 5-10 prominent broad usually nearly straight indusia. Trop. Amer.—In cult. under several names, but apparently not common. The hort. names *A. acutum*, *A. Bausei*, *A. Lathomi*, *A. magnificum*, *A. scutum*, and *A. rhodophyllum* and *A. Victoræ*, Moore, are considered to represent forms or derivatives of this species. Known in cult. chiefly in

Var. **farleyense**, Nichols. (*A. farleyense*, Moore). Fronds large and striking (sometimes 2-3 ft. long and 2 ft. broad), with curving drooping light green sometimes rose-tinted graceful spray; pinnules overlapping, 2 in., more or less, across, cuneate-reniform, deeply cut or almost fringed, the fertile ones narrower.—Named and described in 1866 from specimens received from Farley Hill gardens, Barbados; one of the handsomest greenhouse ferns, in different forms.

3. **A. cuneatum**, Langsd. & Fisch. The prevailing greenhouse fern in N. Amer., in many forms: low slender species, producing many graceful fronds with thin brown-black stipes: lamina ovate-oblong or narrowly deltoid-oblong, often one-sided, 4-12 in. long, 2-3-pinnate, dull green; pinnules cuneate-rhomboid, numerous, stalked,  $\frac{1}{4}$ - $\frac{1}{2}$  in. across, lobed, bearing 3-5 small orbicular-reniform indusia. Brazil.—A cult. form with white-striped pinnules is var. *variegatum*, a crested form is var. *grandiceps*, Moore. Var. **Croweanum**, Benedict (*A. Croweanum*, Hort. Crowe), is a large very vigorous hardy form, the fronds keeping well when cut and useful for florist's work; bears the name of Peter Crowe, Utica, N. Y.; introduced about 1904. Var. **gracillimum**, Schneid. (*A. gracillimum*, Moore), has very finely divided fronds, the pinnules  $\frac{1}{32}$ - $\frac{1}{16}$  in. across. To *A. cuneatum* or its derivatives are to be referred the names *A. fragrantissimum*, Hends., *A. mundulum*, Moore, *A. versailense*, Schneid., and many others.

4. **A. decorum**, Moore. Erect rather stiff fern with narrow fronds on stout dull brown-black stipes: lamina oblong to ovate-oblong, 5-10 in. long and half or more as broad, dull green, rather thick; pinnules rhomboid or cuneate-rhomboid, short-stalked, notched, with very few large reniform indusia. Peru.—The cult. plant is mostly known as **A. Weigandii**, Moore, which differs, according to Moore, in the larger and less cuneate or cuneate-trapezoid pinnules; bears the name of Mr. Weigand, Astoria, Long Island, N. Y.; described by Moore in 1883. To *A. decorum* are probably to be referred *A. Wagneri*, Mett., and *A. elegans*, Moore; perhaps the species itself is to be combined with *A. tinctum*, Moore, which is an older name.

8. **PELLÆA**, Link. CLIFF BRAKE. Sixty to 70 species of wide distribution, the plants mostly small and with tufted hard shining stipes, growing mostly on or among rocks; two are frequent in greenhouses.—Fronds pinnate or 2-3-pinnate, the fertile ones usually with narrower pinnae or segms.: sori at or near the tips of free veins, circular or oblong, usually becoming confluent to form a marginal line covered by the reflexed edge of the frond. (Pellæa: Greek *dark*, alluding to the dark-colored stipes.)

Fronds pinnate..... 1. *P. rotundifolia*  
Fronds variously 2-3-pinnate..... 2. *P. viridis*

1. **P. rotundifolia**, Hook. (*Allosurus rotundifolius*, Kunze). Fronds 6-12 in. long, narrow, 1-pinnate, the stipe and rachis brown-hairy and chaffy; pinnae 20-40, alternate, orbicular to broad-oblong, the terminal one ovate to hastate-ovate, all very short-stalked, entire, slightly toothed or obscurely angled. New Zeal.

2. **P. viridis**, Prantl (*P. adiantoides*, J. Sm. *P. hastata*, Link, not Thunb.). Fronds  $\frac{1}{2}$ -2 ft. long, oblong to ovate-oblong in outline, upper pinnae entire or



pinnate, the lower pinnæ 1- or 2-pinnate; stipe stout, brown, shining; ultimate divisions varying from linear-oblong to narrowly ovate to hastate, obtuse or more or less acute; large well-developed fronds are 3-pinnate. Afr.

9. **PTERIS**, L. Plants of medium or large size on many parts of the globe, variously defined, of 150 or more species, a few of which are among the commonest greenhouse and window-garden ferns.—Fronds once- or more pinnate: sori on a narrow receptacle connected in a marginal line under a simple indusium formed of the revolute edge of the frond, mostly connecting the ends of free veins. (Pter-is [ter-is]: Greek *wing*, applied to ferns because of their feathery or wing-like character.)—The related genus *Pteridium* is distinguished by a double indusium, one of which is within the receptacle; it includes the common wild brake, *Pteridium aquilinum*, Kuhn, heretofore usually included in *Pteris*. The five species of *Pteris* here described comprise the usual ones in cult.; they have free (not meshed or reticulating) veins. While the first three species are distinct in their native condition, it is not always easy to distinguish them in some of the cultivars.

Fronds small, 1-pinnate, but the lower pairs of pinnæ forked or divided.

Upper pairs of pinnæ strongly decurrent, i. e., the rachis conspicuously winged in two or more spaces..... 1. *P. serrulata*

Upper pinnæ little or not at all decurrent (in some hort. forms the terminal pinna divided nearly to midrib)..... 2. *P. ensiformis*

Sterile fronds much unlike the fertile..... 3. *P. cretica*

Sterile fronds much like the fertile except pinnæ broader and perhaps shorter..... 4. *P. tremula*

Fronds large, bipinnate.

Ultimate divisions of the frond serrate..... 5. *P. quadriaurita*

Ultimate divisions entire.....

1. *P. serrulata*, L. f. (*P. multifida*, Poir.). Slender: fronds 8-24 in. long including the slender pale stipe which is 6-8 in. long, the blade oblong or ovate-oblong in outline, 6-10 in. broad, with 4-8 pinnæ which are opposite or nearly so; pinnæ very narrow, the fertile ones usually less than  $\frac{1}{4}$  in. wide (broader forms in cult.) and very long, the lower ones 2-3-forked; rachis prominently winged toward the top, the wing narrowing below; sterile fronds much like the fertile but the parts mostly broader and the margins sharp-serrate, as usually, also, are the long slender tips of the fertile fronds. China, Japan, also escaped from cult. in S. U. S.—Many cristate and other forms, represented by such hort. names as vars. *angustata*, *corymbifera*, *cristata*, *nana*, *variegata*, *voluta*; perhaps *P. Ouwardi*, Hort., is of this species rather than the following.

2. *P. ensiformis*, Burm. (*P. crenata*, Sw.). Very slender species: fertile fronds erect, long and narrow, overtopping the sterile ones, rising 12-20 in. with long naked stipes, the divisions  $\frac{1}{4}$  in. or less broad and usually almost linear, the lower ones 5-7-parted; sterile fronds shorter, small and narrow, the divisions short and broad and obtuse, the terminal parts sometimes fertile (sterile segms.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long and nearly or quite half as broad). E. Asia, Malasia, Australia.—Var. *Victoriæ*, Baker, has divisions of foliage banded and cross-barred with white.

3. *P. cretica*, L. A stouter plant than No. 1, with all frond-divisions normally broader, more than  $\frac{1}{4}$  in. wide (narrower forms in cult.); rachis mostly not winged at top, except in some hort. forms and then not much below the first pair of pinnæ, although the forking and cresting of the terminal pinna may give the appearance of a long-winged rachis. Tropics and subtropics in many parts of the world.—Var. *albo-lineata*, Hook., a very common fern, has divisions prominently whitened along the center. Cristate, multifid, enlarged, and other forms are known as vars. (or as if species) *Alexandrae*, *Childsii*, *cristata*, *magnifica*, *Mayii*, *nobilis*, *Wilsonii*, *Wimsettii*.

4. *P. tremula*, R. Br. Strong bright green large decorative fern with finely cut soft foliage: stipe smooth, brown, shining; lamina 1-3 ft. or more long and 6-24 in. broad, 2-3-pinnate in the lower part, the narrow segms. finely serrate. New Zealand, Australia.—Modified and variegated forms are in cult.

5. *P. quadriaurita*, Retz. Strong rather coarse fern, with heavy foliage: stipe usually chaffy, at least when young; lamina 1-2 ft. long, 2-3-pinnate below, the long-oblong mostly curved stiffish segms. entire and strongly veined, nearly or quite  $\frac{1}{4}$  in. broad. Tropics around the world.—Most familiar in var. *argyræa*, Hook., the pinnæ whitish-banded lengthwise. There is also a form (var. *tricolor*) with bands whitish and reddish.

10. **BLECHNUM**, L. More than 130 species (if *Lomaria* is included) of rather coarse or stiff ferns, mostly trop. but some of them in temp. regions, of wide distribution, a few frequent in greenhouses.—Fronds pinnate or pinnatifid: sori close to the midrib of the pinna or segm. and parallel with it, forming a prominent continuous line; involucre distinct from the margin of the frond. (Blech-num: Greek name for some kind of fern.)

Sterile and fertile fronds much alike.

Frond deeply pinnatifid, the segms. joined..... 1. *B. brasiliense*

Frond pinnate, the pinnae for the most part distinct..... 2. *B. occidentale*

Sterile and fertile fronds different, the latter with contracted pinnae..... 3. *B. gibbum*

1. **B. brasiliense**, Desv. Stout large fern, old specimens producing a scaly trunk 1–3 ft. high: fronds abundant, 1–3 ft. long, 8–15 in. broad, oblong in outline, pinnatifid nearly to the rachis, the more or less alternate long irregularly finely serrate segms. joined by wide-spreading base to those above and below: sori lines not extending to the tip. Brazil, Peru.

2. **B. occidentale**, L. Relatively small, not forming a trunk: fronds 8–18 in. long, lanceolate, long-pointed, distinctly pinnate except toward the top; pinnae 1–3 in. long, broad and sometimes auricled at the base, often upwardly curved, short-pointed, the margin entire: sori lines usually extending nearly to the tip. American tropics.

3. **B. gibbum**, Mett. (*Lomaria gibba*, Labill.). Rapid-growing fern producing a trunk 3–5 ft. high: fronds 2–3 ft. long with short dark-sealy stipes, 6–12 in. broad, mostly oblong in outline, narrowing below, deeply pinnatifid; sterile segms. 2–4 in. long, to  $\frac{1}{2}$  in. broad, finely serrate, obtuse or mucous; fertile segms. much narrower and often longer, the sori lines eventually covering most of the surface. New Caledonia, Aneiteum in the S. Pacific.

11. **PHYLLITIS**, Hill. Simple-fronded rather small ferns in many disconnected parts of the world, 9 or 10 species all closely related, sometimes planted in the open.—Sori long, standing at nearly right angles to the midrib, in pairs on the side veins with the indusia opening outward. (Phyllitis: Greek leaf.)

**P. Scolopendrium**, Newm. (*Scolopendrium vulgare*, Sm.). HARTS-TONGUE FERN. Fronds 12–18 in. long, straight or curved, 1–3 in. wide, the chaffy stipe long or short, blade simple and entire, sometimes undulate, the base cordate or auricled, apex blunt or short-acute: sori sometimes extending from bottom to top of the frond, at other times only on the upper part, extending nearly to the margin. (*Scolopendrium*: Greek *scolopendra*, centipede, alluding here to the many lines of fructification.)—Very local and rare in N. Amer.; in Eu. it has given rise to many cristate, divided, crisped, angustate, dwarf, and other forms.

12. **ATHYRIUM**, Roth. Nearly or quite 100 pinnate or pinnatifid ferns, of medium size, largely trop. and subtrop. in eastern and western hemispheres, one of which has given many forms in garden cult.; formerly included in *Asplenium*.—The special generic character lies in the sori, which are oblong or narrow-oblong, usually curved and sometimes more or less horseshoe-shaped, mostly crossing a vein. (*Athyrium*: Greek *without shield*, the indusium only on the side.)

Sori short, the indusia more or less curved..... 1. *A. Filix-femina*

Sori large, the indusia kidney-shaped..... 2. *A. Goeringianum*

1. **A. Filix-femina**, Roth (*Asplenium Filix-femina*, Bernh.). LADY FERN. Tall soft-foliaged bright green fern with erect rhizome: stipes shaggy but becoming smooth and shining, 1 ft. or less long; lamina 1–3 ft. long, broad-lanceolate or ovate-oblong in outline, 2-pinnate, the pinnae alternate and bearing 15–20 or more pairs of deeply pinnatifid and toothed acute segms.  $\frac{1}{4}$ –1 in. long: sori strongly curved, some of them becoming confluent. Moist woods, Canada and U. S., also Eu., Afr., Asia.—Many odd kinds of lady fern have received names, but the plant is little cult. from hort. sources in N. Amer.: the variations run into the hundreds. Such vars. as *crispum*, *grandiceps*, *laciniatum*, *latifolium*, *multifidum*, *plumosum*, may be expected in collections. Var. **Craigii**, Moore, is a dwarf crested fern with

red stipes. Var. *Victoriæ*, Moore, is a remarkable form with pinnæ forked to the base, these forks extending forward and backward giving the frond a criss-cross effect, the tips being forked and crested. (*Victoriæ*: Queen Victoria, "queen of the Lady Ferns.") Some students separate the east-American lady ferns from the European.

2. *A. Goeringianum*, Moore (*Asplenium Goeringianum*, Mett.). Fronds deciduous, 8-18 in. long (stipe 6 in.), more or less pendulous, lanceolate, pinnate; pinnæ pinnatifid, the segms. serrate or incised: sori kidney-shaped. (Named for Herr Goering, early collector in Japan.) Japan.—In cult, in var. *pictum*, Hort., with reddish rachis and gray-green central band due to the coloration of the bases of the pinnæ.

13. **ASPLENIUM**, L. SPLEENWORT. Several hundred species in many regions of the world, mostly evergreen, with simple, pinnatifid and pinnate fronds, many of which have been introduced to cult. but very few common.—Sori oblong to elongated, mostly straight but sometimes curved, attached to upper side of oblique veinlets. (*Asplenium*: Greek, in allusion to supposed remedy for diseases of the spleen.)

|   |                         |
|---|-------------------------|
| Frond simple (undivided but sometimes irregularly lobed)..... | 1. <i>A. Nidus</i>      |
| Frond pinnate or 2-3-pinnate.....                             |                         |
| Segms. linear, entire.....                                    | 2. <i>A. Belangeri</i>  |
| Segms. divided.....   | 3. <i>A. bulbiferum</i> |

1. *A. Nidus*, L. (*A. Nidus-Avis*, Hort.). BIRDS-NEST FERN. A striking plant with erect-flaring bright green stiff fronds from the crown, producing the effect of a nest-like center: fronds long-oblong to spatulate-ovate, 2-4 ft. long, 2-8 in. broad, attenuate below and with no distinct stipe, the margins entire, undulate, or sometimes with 1 or 2 sinuses as if accidentally lobed. (*Nidus*: Latin *nest*; *Nidus-Avis*, *bird's nest*.) Asia, Polynesia.

2. *A. Belangeri*, Kunze. Fronds evergreen, long and narrow, dark green, 12-18 in. long, 2-4 in. wide, pinnate, often with little bulblets at the axils; pinnæ deeply pinnatifid into linear-obtuse segms. about  $\frac{1}{4}$  in. long: sorus single on the segm., occupying half or more the length of it. (Bears the name of Charles Belanger, French botanical traveler of the last century.) Malaya.

2. *A. bulbiferum*, Forst. Fronds  $1\frac{1}{2}$ -4 ft. long, 6-12 in. broad, pinnate to bipinnate, with stipes chaffy or at length smooth, arching or bending with the weight of the numerous little plants borne on the upper surface; pinnæ 3-6 in. long,  $1-1\frac{1}{2}$  in. broad; segms. deltoid- or rhomboid-ovate to oblong in outline, lobed or divided, the lobes narrow and obtuse: sori short, oblong, often at maturity as wide as the lobe. New Zeal., Australia, Malaysia.—Var. *laxum*, Hook. f., is smaller, with narrower pinnæ and more finely divided foliage.

14. **DRYOPTERIS**, Adans. (*Nephrodium*, Rich. *Lastrea*, Bory). As the genus is now mostly understood it comprises several hundred mostly woods ferns in trop. and temp. regions, chiefly the former, on many parts of the globe, very few of which are common in cult.; native species known under *Aspidium* are included in this genus.—Fronds once- or more pinnate, usually erect: sori sometimes naked, but mostly with circular, cordate or kidney-shaped indusia attached at the sinus. (*Dryopteris*: Greek *oak fern*.)

|   |                          |
|---|--------------------------|
| Segms. or lobes serrate.....                                      |                          |
| Sori contiguous or confluent on lower part of segm., brown.....   | 1. <i>D. Filix-mas</i>   |
| Sori separate over greater part of segm., red.....                | 2. <i>D. erythrosora</i> |
| Segms. or lobes entire.....                                       |                          |
| Veins free and simple: small fern.....                            | 3. <i>D. chrysoloba</i>  |
| Veins united, at least toward the midvein: rather large fern..... | 4. <i>D. dentata</i>     |

1. *D. Filix-mas*, Schott (*Aspidium Filix-mas*, Sw. *Nephrodium Filix-mas*, Rich. *Lastrea Filix-mas*, Presl). MALE FERN. Stout woods fern with chaffy rhizome and stipes, the foliage growing in a crown: fronds 2-4 ft. high, firm and nearly evergreen, 2-pinnate, oblong-lanceolate in outline, 6-12 in. broad, pointed; pinnæ  $\frac{3}{4}$ -1 in. broad, long-tapering, with sessile oblong obtuse serrate pinnules: sori large, brown, near the midvein, contiguous and occupying most of the lower two-thirds of the pinnule. Many parts of the world, in the U. S. very northern except in the western mts.—Little grown in N. Amer., although it runs into very many crested, crisped, forked, dwarf, and other forms.

2. *D. erythrosora*, Kuntze. Rather small, the pinnate fronds 12-18 in. long and half or more as broad, from a thick rhizome; pinnæ about  $\frac{3}{4}$  in. broad, acuminate, divided nearly to the middle into obtuse serrate lobes which taper downward on the lower side: sori red, at least when young, usually well separated, contrasting with the bright green fronds. China, Japan.

3. *D. chrysoloba*, Kuntze (*Nephrodium chrysolobum*, Fée. *Lastrea chrysoloba*, Presl). Small species, probably not in general cult., but this and No. 2 seem to be confused although very different: fronds 5-9 in. long and about half as broad, pinnate; stipes scaly and hairy; pinnæ 2 in. or less long and about  $\frac{1}{2}$  in. broad, with lobes or segms.  $\frac{1}{2}$  in. broad, obtuse and entire, the lowest pair somewhat stalked: sori near the tips of the simple veinlets. Brazil, Colombia.

4. *D. dentata*, C. Chr. (*D. mollis*, Hieron. *Aspidium molle*, Sw. *Nephrodium molle*, R. Br.). A common greenhouse fern, under various names, as *Dryopteris parasitica*, *Aspidium violescens*, as well as those above: fronds 1-3 ft. long, pinnate, lamina 6-12 in. broad, surfaces as well as the long stipe and the rachis hairy; pinnæ long and narrow,  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, acuminate, cut one-third to two-thirds of the depth into closely placed obtuse entire lobes, lower pinnæ shorter and more distant; veins running together: sori small and many, covering most of the segm. Tropics of both hemispheres.—There are crested and other forms.

15. **POLYSTICHUM**, Roth. **HOLLY FERN**. Probably 100 species as now defined, mostly woods ferns in temp. regions, widely distributed on the globe; few are well known to cultivators.—Fronds pinnatifid to 4-pinnate, mostly of rough texture, from mostly shaggy rhizomes; ultimate divisions usually spinulose or sharp-serrate, the segms. likely to be auriculate; veins free: sori orbicular, covered by superior indusia attached by the center. (Polystichum: Greek *many rows*, from the sori in the originally-described species.)—Many of these ferns are familiarly known under the name *Aspidium*.

Lower pinnæ 2-pinnate or more.

Teeth of segms. spinulose..... 1. *P. aristatum*

Teeth not spinulose..... 2. *P. adiantiforme*

Lower pinnæ 1-pinnate.

Plant small and slender: cusps of segms. erect..... 3. *P. tsus-simense*

Plant stout: cusps curving or reflexed..... 4. *P. aculeatum*

1. *P. aristatum*, Presl (*Aspidium aristatum*, Sw. *Lastrea aristata*, Moore). Broad-fronded fern, with shaggy or chaffy stipes 10-18 in. long, deltoid-ovate in outline, the lamina 1-2 ft. long and half as broad; upper pinnæ 1-pinnate, lower deltoid and 2-3-pinnate at least at the base; pinnules rhombic-ovate, sessile or very short-stalked, pinnatifid, the segms. or lobes aristate: sori many, not large. Asia to Australia.—Var. *variegatum* has the pinnæ banded along the midrib with whitish-green.

2. *P. adiantiforme*, J. Sm. (*P. capense*, J. Sm. *P. coriaceum*, Schott). Tall spreading plant with stout stipes scaly below but usually becoming smooth: lamina nearly deltoid, 1-3 ft. long, coriaceous, the upper pinnæ 1-pinnate, the lower 2-3-pinnate; pinnules oblong, about  $\frac{3}{4}$ -1 in. long, blunt or short-acute, rather coarsely dentate: sori prominent, midway between rib and margin. Tropics, eastern and western hemispheres.

3. *P. tsus-simense*, J. Sm. (*Aspidium tsus-simense*, Hook.). Small thin-leaved plant often grown in fern-baskets: fronds 10-24 in. long including the slender very shaggy stipe, 2-pinnate, long-lanceolate in outline, acuminate; pinnæ alternate, the upper pinnatifid, the lower pinnate, the pinnules small, pointed, and the teeth short-spinulose and straight: sori large, brown, midway between rib and margin. (Tsus-sima, an island of Japan.) Japan.

4. *P. aculeatum*, Schott (*Aspidium aculeatum*, Sw.). Stout dark-colored fern with thick very shaggy stipe and rachis, the fronds 3-6 in. broad and 1-2 ft. long: pinnæ numerous and close together, alternate, sessile, squarrose, straight or somewhat curved, pinnatifid and the pinnæ again pinnatifid, the segms. and teeth all terminated by slender curved cusps or aristæ: sori usually closely placed and covering the under surface. Practically throughout the world except in arctic regions and E. N. Amer.—Immensely variable and comprising very many synonyms when conceived in the broad sense, including *P. angulare*, Presl. Var. *proliferum*, Hort., is a proliferous form frequently seen in greenhouses. The species is often planted in the open. Some students adopt *P. setiferum*, Rosendahl, for *P. aculeatum*.



16. **CYRTOMIUM**, Presl. A segregate from *Polystichum*, differing in the anastomosing veins; distinguished also from *Dryopteris* by this character and by the centrally attached indusium; species 4 or 5, Asia, Afr., Pacific Isls.—Fronds pinnate, firm: sori large, sown over the large pinnæ. (*Cyrtomium*: Greek *a bow*.)

Margins of pinnæ entire or obscurely undulate (except in certain hort. forms).

|  |                          |
|--|--------------------------|
| Pinnæ ovate.....                           | 1. <i>C. falcatum</i>    |
| Pinnæ lanceolate or oblong-lanceolate..... | 2. <i>C. Fortunei</i>    |
| Margin distinctly dentate .....            | 3. <i>C. caryotideum</i> |

1. **C. falcatum**, Presl (*Aspidium falcatum*, Sw. *Polystichum falcatum*, Diels). HOUSE HOLLY FERN. Stiff erect fern, with stout very shaggy stipes: fronds dark heavy green, 1-2½ ft. long, 4-8 in. broad, long-oblong in outline, pinnate, glossy above; pinnæ alternate, short-stalked, 2-4 in. long, ovate to falcate-ovate, long-acuminate, the margin entire or obscurely wavy: sori circular, large, abundantly scattered over the lower surface. Wide-spread in Japan, China and adjacent continental regions, S. Afr., Polynesia.—Forms with incised pinnæ are known as *C. Butterfieldii*, Hort., and *C. Rochefordianum*, Hort. There are also condensed and dwarf forms, as var. **compactum**, Hort.

2. **C. Fortunei**, J. Sm. (*Aspidium falcatum* var. *Fortunei*, Nichols.). Fronds not glossy above; pinnæ smaller and much narrower, usually 2-3 or 4 in. long and ¾-1 in. or less broad, the base truncate or truncate auricled. (Named for Robert Fortune, page 447.) Japan.

3. **C. caryotideum**, Presl (*Aspidium falcatum* var. *caryotideum*, Nichols.). Drooping in habit, light green: pinnæ mostly larger than in No. 1, distinctly serrate-dentate. Japan, India.

17. **NEPHROLEPIS**, Schott. SWORD FERN. A dozen or more trop. and subtrop. plants, the world around, terrestrial and epiphytic, comprising the most popular of living-house and conservatory ferns.—Fronds long and narrow, pinnatifid or pinnate, the numerous pinnæ jointed to the rachis and often falling; veins forking, free: sori on the upper forks of the veins, the circular or kidney-shaped indusia attached only at the base. (*Nephrolepis*: Greek *kidney scale*.)—Some of the species are in an active state of mutation, giving rise to many odd forms, particularly *N. exaltata*.

Species with narrow fronds, 2½ in. or less wide.

Width of frond about ½ in.: pinnæ orbicular..... 1. *N. Duffii*

Width about 1 in.: pinnæ short-oblong, bluntly toothed..... 2. *N. pectinata*

Width about 2-2½ in.: pinnæ long-oblong to lanceolate, sterile ones mostly rather sharply toothed..... 3. *N. cordifolia*

Species with broad fronds, 3 in. and more, often much more.

Fertile pinnæ much contracted..... 4. *N. acuminata*

Fertile and sterile pinnæ nearly or quite alike.

Pinnæ separated: indusia orbicular: frond mostly 8-12 in. wide... 5. *N. biserrata*

Pinnæ contiguous: indusia reniform: frond normally about 6 in. or less wide..... 6. *N. exaltata*

1. **N. Duffii**, Moore (*N. cordifolia* var. *Duffii*, Goebel). Graceful slender plant of tufted habit: fronds 1-2 ft. long, arching, ½ in. wide more or less, usually furcate or crested at the top, stipes and rachis chaffy-hairy; pinnæ numerous, alternate, sessile, nearly or quite orbicular, about ¼ in. across longest way, indistinctly wavy-toothed. (*Duffii*: Mr. Duff, of the Sidney Botanic Garden, New S. Wales.)—A sterile fern supposed to have come from New Zealand or the South Sea Isls., wide-spread in cult. in American tropics; probably a mutant from *N. cordifolia*.

2. **N. pectinata**, Schott (*N. cordifolia* var. *pectinata*, Nichols.). Small and slender compact species with grayish-green spreading or pendulous foliage: fronds 12-18 in. long, about 1 in. wide, with slender nearly or quite naked stipes; pinnæ many, alternate, close together and often overlapping, about ½ in. long, oblong, rounded at apex, auricled on base above, obtusely toothed or small-notched: sori midway between midvein and margin, the indusia broad-reniform. Trop. Amer.

3. **N. cordifolia**, Presl (*N. tuberosa*, Presl. *N. cordata*, Hort.). Erect or nearly so, tufted, with numerous bright green fronds and shaggy stipes, the rhizome tuberiferous: fronds 1-2 ft. long, about 2 or 2½ in. wide, with many pairs of pinnæ close together or overlapping; pinnæ 1-1¼ in. long, long-oblong to lanceolate, very



blunt, auricled on upper side at base, rather sharply toothed (at least the sterile ones): sori many, midway between midvein and margin, the indusia reniform. Tropics and subtropics, around the world; planted in full sunshine in S. Calif.

4. *N. acuminata*, Kuhn (*N. davallioides*, Kunze). Large plant with arching or drooping fronds, and producing many runners: stipes grooved, scaly at the base, rachis hairy; fronds 2-3 ft. long and 8-12 in. and more broad; pinnæ alternate, far apart, long-linear-lanceolate, acuminate, base auricled or truncate above, coarsely obtusely dentate, the upper ones much narrower and with projecting teeth on which the reniform indusia are borne. Malaysia.

5. *N. biserrata*, Schott (*N. acuta*, Presl). Stout fern with arching or drooping habit, thick foliage, the stipes and rachis more or less scurfy-hairy: fronds 2-4½ ft. long, 4 or 6-12 in. broad, the pinnæ distant or well separated; pinnæ 2-6 in. long, long-oblong-lanceolate, short-pointed, the base rounded below and more or less short-auricled on the upper side, the margins obscurely crenate to crenate-serrate: sori nearer the margin than the midrib, the indusia orbicular. Tropics around the world.—A forked form, var. *furcans*, Hort., is common in cult. and is likely to be named as No. 4.

6. *N. exaltata*, Schott. Strong erect stiff fern, with the tops of the narrow fronds spreading: stipes channelled, shaggy or smooth, upper rachis mostly hairy but sometimes smooth; fronds 2-5 ft. long, 3-5 or 6 in. broad, the pinnæ close together; pinnæ oblong-lanceolate or the sterile ovate-lanceolate, 1½-3 in. long, acute, base truncate and auricled on upper side, entire or obscurely crenulate: sori about midway, the indusia reniform. Tropics and adjacent regions (as S. Fla.) of both hemispheres.—In recent time, this species has given rise to great numbers of sports or mutants, some of them with much-divided delicate fronds, even 4- and 5-pinnate. Crested forms are among them. The extreme mutants bear little resemblance to *Nephrolepis*, and they are likely to bear few sori. However, simpler fronds are likely to arise in the midst of the modified ones, and from these the student is able to make identification as to species. *N. exaltata* seems now to be rare in cult., its place being taken by the spreading drooping variously modified mutants.

Var. *bostoniensis*, Davenport. BOSTON FERN. Strong free grower with widely spreading or drooping foliage less stiff and rigid than in *N. exaltata* itself: fronds large, broad; pinnæ 3-4 in. long and often ¾ in. wide, entire or crenulate, more or less undulate.—Introduced 1895. From this mutant, or its derivatives, have arisen most of the other forms, as vars. *elegantissima*, *magnifica*, *muscosa*, *robusta*, *Scholzii*, *Scottii*, *superbissima*, *Whitmanii*.

18. **DAVALLIA**, Sm. Terrestrial and epiphytic ferns of mostly small size and finely divided foliage but diverse habit; 60-70 species in warm and trop. parts of the Old World.—Rhizome creeping, mostly densely chaffy, the stipes not jointed to it: fronds 1-3-pinnate, usually ovate or deltoid in outline: sori at or near the margins, the indusia tubular or semi-cylindric and opening toward the margin, attached by both base and side; the indusium usually occupies nearly or quite the width of the lobe on which it is borne, but the apex of the lobe may project beyond it forming one or two horns. (Davallia: Edmund Davall, Swiss botanist, end of 18th cent.)—The abundant slender tortuous rhizomes of the commonly cult. species spread on the surface of the ground or cling over the side of the pot or block. Some of them are called hares-foot ferns.

Ultimate lobes or divisions linear, usually less than ½ in. broad, not sharp-toothed: no horns beyond the indusium..... 1. *D. fejeensis*

Ultimate lobes broader, ½ in. or more: one or more horns usually present.

Lobes usually sharp-toothed at apex.

Fronds deciduous, the lamina usually less than 1 ft. long..... 2. *D. bullata*

Fronds not deciduous, lamina usually more than 1 ft. long at maturity..... 3. *D. dissecta*

Lobes not sharp-toothed at apex..... 4. *D. canariensis*

1. *D. fejeensis*, Hook. Handsome evergreen fern with very finely divided foliage: rhizomes thick, nearly straight: fronds erect but drooping with age, with angled stipes smooth except at base; lamina deltoid, 12-18 in. long, 4-pinnatifid, the many ultimate lobes linear and somewhat broadened at the summit where the sori are borne, producing no horns beyond the indusia. (Fejeensis: Fiji Islands, whence it comes.)—It runs into several forms in cult.

2. *D. bullata*, Wall. SQUIRRELS-FOOT FERN. Small fern with deciduous fronds from creeping forking rhizomes, grown in fern-balls and otherwise: lamina 6-12 in. long and half or more as broad, ovate, 4-pinnatifid but the sharp-toothed divisions not very narrow: sori usually near one margin of the lobe, a horn commonly projecting beyond it. Malaysia, India, Japan.

3. *D. dissecta*, J. Sm. Finely divided delicate but strong plant, with extensively creeping rhizomes: lamina 12-18 in. long when full grown, nearly as broad, deltoid, 4-pinnatifid, the ultimate lobes mostly rather broader than in No. 2: sori central, occupying nearly or quite the width of the lobe, the teeth or horns often or commonly 2. Java.—Often grown as *D. elegans* and *D. affinis*, which are properly synonyms of other species.

4. *D. canariensis*, Sm. Strong-growing decorative fern: rhizomes crooked: lamina 12-18 in. long and 8-12 in. broad, broad-deltoid in outline, 4-pinnatifid; lobes very many, usually obtuse and not sharp-toothed or horned at the apex: sori occupying the width of the lobe. Canary Isls., as also on adjacent isls. and mainlands.

19. ODONTOSORIA, Fée. A segregate from Davallia, of which it was formerly a section, differing in the scale-like indusium which opens at the top, the ultimate segms. of the decomposed fronds mostly short-cuneate; species about 20, mostly trop., eastern and western hemispheres. (Odontosoria: Greek, referring to the toothed segms.)

*O. chinensis*, J. Sm. (*O. tenuifolia*, J. Sm. *Davallia tenuifolia*, Sw. *D. chinensis*, Sm. *Stenoloma tenuifolium*, Fée). Small graceful fern with prostrate chaffy-hairy rhizomes: lamina 18 in. or less long and about half as wide, broad-ovate to ovate-oblong in outline, 3-4-pinnatifid; ultimate lobes cuneate, about  $\frac{1}{2}$  in. long, more or less truncate: sori 1 or 2 at the apex of a lobe, usually 1, mostly broader than long. Trop. and E. Asia, Polynesia.

20. DENNSTAEDTIA, Bernh. Fifty to 60 species of large or medium size, mostly within the tropics around the world; one (*D. punctilobula*, Moore, formerly referred to Dicksonia) is native in N. Amer. and is sometimes transferred to grounds.—Once-3-pinnate ferns, with hairy, erect or creeping rhizomes: veins free: sori at or very near the margin; indusium inferior, cup-like, attached at both base and side, open at top, joined on the outer side to the margin or a reflexed tooth. (Dennstaedt-ia: August Wilhelm Dennstaedt, early German botanist.)

*D. cicutaria*, Moore (*Dicksonia cicutaria*, Sw. *Sitobium cicutarium*, J. Sm.). Rhizome creeping: frond large, 3-8 ft. high, with stout brown often hairy stipes; lamina 2-pinnate, 2-3 ft. across at the base, the pinnae pinnatifid into oblong nearly or quite obtuse strongly toothed segms.: sorus cup-shaped or urn-shaped, in a sinus. Trop. Amer.

## 5. SALVINIACEÆ. SALVINIA FAMILY

A score or less of small free-floating plants in 2 genera, widely spread on the globe, one of which is frequently grown in aquaria and greenhouse tanks.—Spore-bearing bodies soft and delicate, borne on a peduncle beneath the lvs. or fronds: spores of two kinds, the macrospores producing an archegonium-bearing prothallus and the microspores an antheridium-bearing prothallus or gametophyte: fronds appearing to be 2-ranked, as they float flat or nearly so, or else imbricated.

**SALVINIA**, Adans. SALVINIA. Lvs. expanded,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, entire or at least not cut, the sts. usually simple or unbranched, more or less pimpled or hairy on the under surface: peduncle of the fruiting bodies very short, the bodies globose or nearly so, the sori contained within them. (Salvin-ia: Antonio Maria Salvini, 1633-1729, professor in Florence, Italy.)

*S. auriculata*, Aubl. (*S. natans*, Hort., not All. *S. brasiliensis*, Hort.). Lvs. circular or nearly so (distinctly oblong in the true *S. natans*), often heart-shaped at base, short-stalked, about  $\frac{3}{8}$  in. across, forming masses on the water. Trop. Amer.; frequent in greenhouses.

## 6. SELAGINELLACEÆ. SELAGINELLA FAMILY

Moss-like branching terrestrial plants, usually perennial, creeping or erect or climbing, mostly trop., of a single genus (*C*, *Cc*, Fig. 4).

**SELAGINELLA**, Beauv. More than 500 species, a few of which are grown in glasshouses for the decorative habit and herbage sometimes under the name Lycopodium.—Plants mostly rooting from the sts.: lvs. scale-like, all alike and imbricated, or in most species of two kinds or sizes and 4-ranked, one kind (usually the larger) on either side of the st. (technically known as lvs. of the lower plane) and the other kind on the upper or under surface of the st. or both (upper plane): fructification in terminal leafy or bracted mostly 4-ranked sessile spikes, comprising two kinds of spores in spore-cases, microspores usually in the upper axils and macrospores in the lower axils, but sometimes the two opposite each other along the spike. (Selaginella: diminutive of *Selago*, ancient name of a lycopodium.)—The native *S. apus*, Spring, is sometimes grown in rockwork and greenhouses for its soft mat-like herbage.

- A. Plant prized in its dried state..... 1. *S. lepidophylla*
- AA. Plant prized in its growing state.
  - B. Main st. creeping and rooting.
    - c. Lvs. broad, short-acute or blunt, the midrib prominent..... 2. *S. uncinata*
    - cc. Lvs. narrow, very acute or tapering, midrib faint..... 3. *S. Kraussiana*
  - BB. Main st. erect or ascending.
    - c. Sts. leafy to the base, branching low.
      - d. Roots confined to base of st..... 4. *S. Emmeliana*
      - dd. Roots produced from lower half of st..... 5. *S. Martensii*
    - cc. Sts. branching above and naked or nearly so below, producing a stipe-like effect.
      - d. Color of sts. crimson..... 6. *S. erythropus*
    - DD. Color of sts. greenish, straw-colored, or sometimes pinkish.
      - e. Lvs. on st. imbricated, cuspidate and scale-like, this part of st. short..... 7. *S. flabellata*
    - EE. Lvs. not represented by imbricated scales, this part of st. 6–12 in. long.
      - F. St. green or greenish, with contiguous long-cuspidate lvs. 8. *S. caulescens*
      - FF. St. whitish or light straw-colored, with widely spaced obtuse or short-acute lvs..... 9. *S. Braunii*
      - FFF. St. dark straw-colored or brownish, with remote narrow very sharp lvs..... 10. *S. Vogelii*
  - BBB. Main st. climbing..... 11. *S. Willdenovii*

1. *S. lepidophylla*, Spring. RESURRECTION PLANT. Sts. densely tufted, stiff, 2–4 in. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. and more broad, the growth flattened but rolling up and curling when dry into a ball which expands when wet and discloses the green upper surfaces: lvs. firm, closely imbricated, ovate and obtuse, scarious-margined, lighter beneath: spike erect and prominent, with sharp-pointed bracts and sporophylls. Tex. and S.—Probably not cult., but often sold as a curiosity and sometimes kept alive; even when dead it will “resurrect” or expand several times when placed in water. *S. pilifera*, Braun, of Tex. and Mex., is distinguished by the cuspidate lvs.

2. *S. uncinata*, Spring (*S. cæsia*, Hort. *Lycopodium cæsium*, Hort.). Soft delicate creeping very leafy plant with a blue-green cast (whence the name *cæsia*), the sts. 1–2 ft. long and producing many long roots, not jointed where the branches start, the main st. projecting beyond the branches and between the branches bearing large separated lvs.  $\frac{1}{2}$  in. long: lvs. of the lower plane placed close together and spreading, making short flat branches or sprays  $\frac{1}{4}$  in. wide, cordate-ovate and acute, not ciliate, the midrib prominent; lvs. of upper plane much smaller, imbricated, cuspidate. China.

3. *S. Kraussiana*, Braun (*S. japonica*, Miq., not Macnab). Soft moss-like bright green creeping plant, freely rooting, the growing tips usually not projecting beyond the foliage and the plant therefore with tufted or furcate ends, the st. jointed or articulated where the branches arise, the main st. between the branches with closely separated foliage: lvs. of lower plane close together on the short branchlets, oblong or lance-oblong and acute, cordate or rounded at base, margins minutely ciliate, midrib not conspicuous; lvs. of upper plane much shorter, long-acute: spikes short, with 4-ranked cuspidate keeled scales. (Named for Herr Krauss, a collector in S. Afr.) Azores to Cape Colony.—The commonest species in cult., grown as a pot-cover and spreading under benches and in open places in the

greenhouse. Known erroneously as *S. denticulata* (and *Lycopodium denticulatum*), a species apparently not in cult. Var. *Brownii*, Hort. (*S. Brownii*, Hort.), is a dwarf compact form, scarcely running. There is also a variegated form.

4. *S. Emmeliana*, Van Geert (*S. cuspidata* var. *Emiliana*, Nichols.). A bright green erect-spreading very ornamental plant: sts. 6-12 in. high; rather closely covered with ovate-cuspidate ciliate lvs., more or less bipinnate-branching nearly or quite to the base and rooting only at or near the base: lvs. on lower plane on the branches falcate-ovate and cuspidate, ciliate; lvs. on upper plane about half as large, ovate and long-cuspidate, ciliate: spikes  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, 4-sided, with very sharp imbricated ciliate scales. (Bears the name of Th. Emmel, a German gardener.) Trop. Amer.—Probably the commonest species grown for pot specimens. Var. *aurea* has yellowish foliage; var. *variegata* has whitish markings.

5. *S. Martensii*, Spring. A soft profuse grower, making heavy frond-like foliage that breaks easily at the surface of the ground: sts. 6-12 in. long, ascending, throwing down roots freely from the lower half, leafy nearly or quite to the base: lvs. of lower plane oblong,  $\frac{3}{8}$  in. long, obtuse or mucous, ciliate, the midrib prominent, those on the main st. separated or contiguous and on the branchlets close together: lvs. of the upper plane much smaller, ovate or oval, aristate, imbricated: spikes  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, 4-sided, the scales ovate-acute, keeled. (Georg von Martens was a German botanist of last century, who wrote also on Mex. plants.) Mex. —Runs into many forms. Var. *variegata* has albinous branchlets and markings.

6. *S. erythropus*, Spring. Plant erect, 10-12 in. high, with deltoid outline of frond, densely foliated: st. branchless in its lower third or half, crimson (whence the name), the naked part terete and bearing small crimson acute lvs. which are separated but contiguous: lvs. of lower plane close together and more or less overlapping, falcate-oblong or -ovate, short-acute; lvs. of upper plane smaller, ovate, short-pointed, overlapping: spike  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, 4-sided, the scales cuspidate and keeled. W. Indies, Cent. Amer., S. Amer.

7. *S. flabellata*, Spring. Rather stiff erect plant 4-8 in. high, the sts. sometimes taller: st. branchless below, bearing acute ciliate lvs. closely placed and appressed: lvs. of lower plane prow-shaped, contiguous and divaricate, giving the main st. a winged effect, acute, ciliate; lvs. of upper plane much smaller, ovate or ovate-lanceolate, long-pointed: spike 1 in. or less long, 4-sided, with strongly keeled cuspidate scales. Tropics and subtropics around the world.

8. *S. caulescens*, Spring. Tall erect bright green plant 12-24 in. high, with elongated frond-like character: st. stiff, terete, the lower half or third branchless and bearing small narrow appressed separated lvs. with slender sharp points: lvs. of lower plane falcate-oblong, acute, close together; lvs. of upper plane much smaller, ovate, appressed and overlapping, very acute: spikes numerous, giving a fruiting frond an appearance of many narrow hard branchlets, about  $\frac{1}{2}$  in. long, 4-sided, with ovate sharply acute keeled scales. Malaya, China, Japan.—Var. *japonica*, Baker (*S. japonica*, Macnab, not Miq.), is less decomposed, and lvs. of lower plane broadly ovate, lvs. of naked st. somewhat spreading and broad.

9. *S. Braunii*, Baker (*S. pubescens*, A. Br., not Spring). Slender erect species, 10-18 in., with small fine foliage, open narrow growth, and whitish or straw-colored sts. that bear few scattered oblong, obtuse or acutish lvs., more or less pubescent at least toward the top, the lower half or third destitute of branches: lvs. of lower plane short, oval, obtuse, close but not overlapping, somewhat revolute; lvs. of upper plane about one-half as large, oblong-ovate, acute: spike short, 4-sided, the scales cuspidate and not concealing the sporangia. (Named for Alexander Braun, 1805-1877, distinguished German botanist.) W. China.

10. *S. Vogelii*, Spring (*S. africana*, A. Br.). Stout plant with broad green or bronzed fronds, 1-2 ft.: sts. stiff and terete, brown, branchless on lower half or two-thirds, bearing remote almost setaceous ascending lvs. below and oblong-acute lvs. above: lvs. of lower plane oblong-lanceolate, close together but not overlapping, short-acute, more or less revolute: lvs. of upper plane very small, ovate, long-cuspidate: spike  $\frac{1}{2}$  in. or less long, the scales ovate, long-pointed, keeled. (Named for the German botanist, Herr Vogel, who collected at Fernando Po.) Afr.

11. *S. Willdenovii*, Baker (*S. lævigata*, Spring, not Baker. *S. cæsia arborea*, Hort.). Climbing to 20 ft. or more, but young plants erect, producing many decomposed fronds at intervals, the foliage usually with a blue-green cast, sending down long roots freely: main st. more or less angled, light straw-colored, bearing few oval obtuse lvs., widely spaced: lvs. of lower plane crowded and overlapping, oblong, obtuse, with strong midrib; lvs. of upper plane much shorter, oblong-ovate, acute: spike 1 in. or less long, 4-sided, with sharp-pointed keeled scales. (Karl Ludwig Willdenow, 1765-1812, eminent German botanist.) Old World tropics.





FIG. 5. GYMNOSPERMS.

*A*, *Taxus*, with berry-like fruit at *Aa*. *B*, Year-old pistillate cone of *Pinus*; *Bb*, scale removed, with 2 ovules beneath. *C*, Staminate cone of *Pinus*. *D*, Pistillate cone of *Pinus* in anthesis; *Dd*, the naked ovules. *E*, Old pine cone, the scales spreading and seeds discharged. *F*, Young pistillate cones of red-cedar (*Juniperus*); *Ff*, mature cone or 'berry.' *G*, *Ginkgo* with leaves and pistillate flowers; *Gg*, fruit and seed; *Ggg*, staminate catkin and stamen. *H*, Pistillate cones of *Chamaecyparis*.



# SPERMATOPHYTA

## 7. CYCADACEÆ. CYCAS FAMILY

A family of 9 genera and about 85 species, distributed in trop. and subtrop. regions, several genera having representatives in cult. for greenhouse use and out-of-doors far S.—Plants of palm-like habit, more or less woody, with thick columnar mostly unbranched or tuber-like st.: lvs. alternate, pinnate or bipinnate, circinate when unfolding like those of the fern: stamens and carpels borne in cones or in temporarily terminal clusters like a crown in the center of the rosette of lvs.; scales of the staminate cone bearing very many scattered anthers on the under side: carpels open, not forming a closed ovary, either lf.-like, pinnatifid and bearing marginal ovules, or peltate with 2 or more suspended ovules, the latter very large, often 1 in. long, with 1 integument, becoming drupe-like.—A family isolated among the Gymnosperms, and in geologic ages represented by a much larger number. Species of *Dioon* and *Encephalartos* are sometimes grown in the larger conservatories.

**CYCAS**, L. Among the most striking ornamentals of trop. and subtrop. gardens, also common in cult. under glass; species about 16, mostly in trop. Asia, Australia, and Polynesia; often spoken of as “palms” although having nothing in common with palms except the general habit and stout mostly unbranched caudex.—Dioecious plants with columnar st. covered by the persisting bases of the old lvs.: lvs. pinnately divided into segms. having only the single mid-nerve: staminate infl. cone-like, erect, terminal, composed of modified scale-like lvs. which bear on the under surface globose pollen-sacs corresponding to microsporangia; pistillate infl. consisting of a tuft of spreading carpellary lvs., the margins with coarse notches in which are borne the naked ovules. (Cy-cas: from the Greek name for a palm tree.)

Margins of pinne flat..... 1. *C. circinalis*  
 Margins of pinne revolute..... 2. *C. revoluta*

1. *C. circinalis*, L. Palm-like with cylindric trunk 10–12 ft. or more; lvs. 5–8 ft. long, with short spines near base of petiole; pinne alternate, 10–12 in. long, linear-lanceolate, acuminate, with flat margins: staminate infl. a woolly cone often 2 ft. long and 5 in. diam., scales tapering into a long hooked spine; pistillate infl. a tuft of spreading, buff-colored, woolly, pinnately notched carpophylls about 6–12 in. long, spinose-toothed along the margin and bearing the naked ovules in the notches: fr. about the size of a walnut, with a thin fleshy covering. Trop. Afr. to Guam.

2. *C. revoluta*, Thunb. SAGO-PALM. Palm-like, 6–10 ft. high, the trunk simple or branched: lvs. recurved, 2–7 ft. long; pinne numerous, curved downward, narrow, stiff, acute, terminating in a spine-like tip, dark shining green, the margin revolute: staminate infl. cylindric, usually 18–20 in. long; pistillate infl. a semi-globose head; carpophylls broadly ovate, densely clothed with a brownish felt-like wool, pectinate: fr. ovate, compressed, red, about 1½ in. long. Java.—The commonest cycad in cult.

## 8. GINKGOACEÆ. GINKGO FAMILY

One deciduous broad-leaved resinous tree of E. China (but not known natively wild), planted as a street or ornamental subject; remainder of a geological group.—Lvs. alternate or in clusters of 3–5 on spurs, fan-shaped, parallel-veined: dioecious; staminate fls. catkin-like, the anthers borne in

pedicelled pairs on a slender axis, fertilization occurring by motile sperm-cells; pistillate fls. usually long-pedicelled and bearing 2 ovules; fr. drupe-like, having a fleshy outer and bony inner coat. *G*, Fig. 5.

**GINKGO**, *L.* One species, technical characters as for family. (Gink-go: Chinese name.)

**G. biloba**, *L.* (*Salisburia adiantifolia*, Sm.). **GINKGO. MAIDENHAIR-TREE.** Glabrous sparsely branched tree to 120 ft. high: lvs. 2-4 in. across, on long slender petioles, more or less incised or divided at broad summit, striated with numerous parallel veins; fr. obovoid or ellipsoid, about 1 in. long, yellowish, with ill-smelling pulp surrounding the thin-shelled 2-angled creamy-white nut which contains an edible sweet kernel.—There are forms with variegated and deeply incised lvs., and with pendulous branches.

## 9. TAXACEÆ. YEW FAMILY

Evergreen shrubs or trees of 12 genera and about 100 species, in trop. and subtrop. regions of both hemispheres, furnishing ornamental subjects for landscape planting.—Bark with resin-tubes: lvs. alternate or rarely opposite, often 2-ranked, needle- or scale-like; plants dioecious or rarely monoecious; staminate fls. cone-like, the anthers borne on the protected portion of more or less apically thickened or peltate scales; pistillate fls. of 1 or 2 ovules borne on a fleshy or rudimentary carpel, the outer integument forming an arillus; fr. a bony-coated seed surrounded by the fleshy often highly colored aril, thereby resembling a soft berry. *A*, Fig. 5.

Lvs. less than  $\frac{1}{2}$  in. across: anthers 3-8-celled.

Under side of lvs. pale gray or yellow: fr. berry-like..... 1. **TAXUS**

Under side of lvs. with glaucous bands: fr. drupe-like.

Glaucous bands narrower than 3 green lines: pistillate fls. reduced to single ovule..... 2. **TORREYA**

Glaucous bands broader than 3 green bands: pistillate fls. of several pairs of 2-ovuled carpels..... 3. **CEPALOTAXUS**

Lvs.  $\frac{1}{4}$ – $\frac{3}{4}$  in. across: anthers 2-celled..... 4. **PODOCARPUS**

1. **TAXUS**, *L.* **YEW.** Eight species distributed throughout the northern hemisphere, planted as lawn specimens and the low forms for ground-cover.—Bark scaly, reddish-brown; branchlets irregularly alternate; winter-buds with imbricate scales; lvs. linear, usually 2-ranked, pale green beneath, without resin-ducts; fls. small, solitary, usually axillary, in early spring; staminate fls. in globose stalked heads, each of 4-8 stamens with 3-8 anther-cells; pistillate fls. of a single terminal ovule with several bracts at base; fr. a bony seed surrounded by a fleshy cup-shaped scarlet disk. (*Tax-us*: ancient Latin name.)—**T. canadensis**, Marsh., native in E. N. Amer., may sometimes be transferred: it is a low shrub with lvs.  $\frac{1}{2}$  in. or less broad and the fr. broader than high.

Lvs. gradually acuminate; scales of winter-buds obtuse, not keeled..... 1. *T. baccata*

Lvs. abruptly pointed; scales of winter-buds acute, keeled..... 2. *T. cuspidata*

1. **T. baccata**, *L.* **ENGLISH YEW.** Tree to 60 ft. high, with a short thick trunk and spreading branches which form a broad low head: lvs. linear,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. long and  $\frac{1}{2}$  in. or less across, gradually acuminate, midrib prominent, dark green above and pale beneath; fr.  $\frac{1}{3}$ – $\frac{1}{2}$  in. across, the aril almost globose, longer than the brown, broadly ellipsoid, slightly 2-angled seed. Eu., N. Afr., W. Asia. —Runs into numerous named forms, with foliage bluish-green, golden-yellow, or variegated with yellow and white, prostrate, erect or fastigate habit, and yellow fr. Perhaps the commonest kinds are var. **adpressa**, Carr. (*T. brevifolia*, Hort., not Nutt.), with lvs.  $\frac{1}{2}$ – $\frac{1}{2}$  in. long, and var. **Dovastoni**, Loud., with horizontal branches and pendulous branchlets. (Named for John Dovaston who raised it in 1777 near Shrewsbury, England.)

2. **T. cuspidata**, Sieb. & Zucc. **JAPANESE YEW.** Tree to 50 ft. high with spreading or upright branches: lvs. linear,  $\frac{3}{4}$ –1 in. long and  $\frac{1}{2}$ – $\frac{1}{8}$  in. across, abruptly

mucronate, contracted into distinct petiole, dull green above and with 2 broad yellow bands beneath, the 2 ranks often upright and forming a V-shaped trough: seed about  $\frac{1}{4}$  in. long, ovoid, compressed, slightly 3 4-angled. Japan, Korea, Manchuria.—There are dwarf forms and vars. with yellow lvs.

2. **TORREYA**, Arn. (*Tumion*, Raf.). Four evergreen trees native in N. Amer. and E. Asia, two sometimes planted. Bark fissured; branches whorled, the branchlets subopposite; winter-buds with few decussate deciduous scales: lvs. linear or linear-lanceolate, 2-ranked, spiny-pointed, with 2 narrow glaucous bands beneath, midrib not distinct above, with resin-duct in middle: staminate fls. of 6-8 whorls of stamens surrounded by bud-scales at base; pistillate fls. of solitary ovule surrounded at base by fleshy aril and several scales: fr. drupe-like, a bony seed surrounded by thin fleshy aril. (Torreya: for John Torrey, 1796-1873, American botanist.)

Lvs. lanceolate,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long ..... 1. *T. nucifera*  
Lvs. linear, 1  $\frac{1}{2}$ -3  $\frac{1}{2}$  in. long ..... 2. *T. californica*

1. **T. nucifera**, Sieb. & Zucc. Tree to 80 ft. high but shrubby in cult., with grayish-brown bark: lvs. lanceolate,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long and  $\frac{1}{8}$ - $\frac{1}{6}$  in. wide, rigid and spiny-pointed, dark green above: fr. obovoid-oblong, about 1 in. long, green. Japan.

2. **T. californica**, Torr. CALIFORNIA-NUTMEG. Tree to 70 ft. or more high, with slightly pendulous branches and grayish-brown bark tinged with orange: lvs. linear, 1  $\frac{3}{4}$  in. long,  $\frac{1}{8}$  in. or less wide, acuminate, lustrous dark green above: fr. oblong-oval or oval, 1-1  $\frac{1}{2}$  in. long, green streaked with purple. Calif.

3. **CEPHALOTAXUS**, Sieb. & Zucc. PLUM-YEW. Six evergreen trees or shrubs native in Asia.—Branchlets opposite: lvs. linear, pointed, arranged in 2 rows, with 2 broad glaucous bands beneath and midrib prominent above: staminate fls. in short-stalked 1 8-fld. clusters, of 4-6 stamens inclosed in a bract; pistillate fls. of small cone with several bracts, each bearing 2 naked ovules: fr. drupe-like, the seed inclosed in a fleshy envelope. (Cephalotax-us: Greek for head, and *Taxus*, the fls. in heads or clusters.)

Lvs. abruptly pointed, 1-2 in. long ..... 1. *C. drupacea*  
Lvs. gradually tapering into point, 2-3 in. long ..... 2. *C. Fortunei*

1. **C. drupacea**, Sieb. & Zucc. Shrub or small tree to 30 ft. high, with gray fissured bark: lvs. in semi-erect ranks, about 1 in. long, abruptly pointed, dark green above: fr. commonly obovate, about 1 in. long, purplish. Japan.—Var. *pedunculata*, Miq. (*C. pedunculata*, Sieb. & Zucc. *C. Harringtonia*, C. Koch), has lvs. to 2 in. long and staminate fls. in branched heads on stalks  $\frac{1}{2}$ - $\frac{3}{4}$  in. long. There are also columnar and dwarf forms.

2. **C. Fortunei**, Hook. Tree to 30 ft. high with reddish-brown bark peeling off in flakes and branches often pendulous at ends: lvs. 2-3 in. long, gradually tapering into sharp point, dark green and shining above: fr. oval, about 1  $\frac{1}{4}$  in. long, purplish. (For Robt. Fortune, page 447.) China.

4. **PODOCARPUS**, L'Her. About 60 species of evergreen trees or shrubs of wide distribution.—Lvs. linear to elliptic, entire, sessile or short-petioled: fls. axillary, solitary or in spikes at the ends of short branchlets; staminate fls. catkin-like, consisting of spirally disposed 2-celled anthers; pistillate fls. of a scale inclosing the ovule with several bracts at its base: fr. drupe-like, the seed borne on a fleshy receptacle. (Podocar-pus: Greek foot and fruit, referring to the fleshy fruit-stalk of most species.)

**P. macrophylla**, Don (*P. longifolia*, Hort.). Tree to 50 ft. high, with pendent branchlets and gray shallowly fissured bark: lvs. narrowly lanceolate, 3-4 in. long and more than  $\frac{1}{2}$  in. broad, acute or obtusish, narrowed into short petiole, lustrous above and with distinct midrib, paler beneath: seed ovoid,  $\frac{1}{2}$ - $\frac{1}{2}$  in. long, the receptacle purplish. Japan.—Var. **Maki**, Sieb. (*P. japonica*, Sieb.), has lvs. to 3 in. long and  $\frac{1}{4}$  in. wide and more upright than the type. (Maki is a Japanese name.) There are also variegated forms.

## 10. PINACEÆ. PINE FAMILY

Resinous trees or shrubs of 33 genera and more than 250 species of wide distribution, furnishing a large part of the coniferous evergreens planted for ornament, and also yielding valuable timber.—Lvs. alternate or opposite or fascicled, linear, needle- or scale-like, mostly evergreen, sometimes deciduous: plants monoecious or rarely dioecious: fls. borne in cones and subtended by scales; scales of staminate cones with mostly 2-6 anthers on under side; ovules solitary or several on surface of a scale: fr. a hard woody cone with dry often winged seeds between the scales, or sometimes berry-like. Fig. 5.

- A. Cone-scales and lvs. spirally arranged. (In *Sciadopitys* the scale-like lvs. are spiral while the prominent lvs. are verticillate.)
- B. Scales of cone subtended by distinct bracts.
  - C. Lvs. in fascicles or clusters, solitary only on shoots.
    - D. Fascicles of 2-5 or rarely 8 lvs. .... 1. PINUS
    - DD. Fascicles of many lvs., 10 or more.
      - E. Foliage persistent. .... 2. CEDRUS
      - EE. Foliage deciduous.
        - F. Staminate fls. solitary: cone-scales persistent ..... 3. LARIX
        - FF. Staminate fls. clustered: cone-scales deciduous ..... 4. PSEUDOLARIX
  - CC. Lvs. solitary.
    - D. Cones upright; scales deciduous. .... 5. ABIES
    - DD. Cones reflexed or pendulous; scales persistent.
      - E. Branchlets roughened by persistent lf.-bases: bracts of cone-scales not exerted.
        - F. Lf. 4-sided, sessile ..... 6. PICEA
        - FF. Lf. flat, short-petioled. .... 7. TSUGA
      - EE. Branchlets not roughened: bracts conspicuously exerted. 8. PSEUDOTSUGA
- BB. Scales of cones without distinct bracts.
  - C. Lvs. of two kinds, one scale-like and scattered, the others linear and verticillate. .... 9. SCIADOPITYS
  - CC. Lvs. always scattered.
    - D. Ovules 1 under each cone-scale. .... 10. ARAUCARIA
    - DD. Ovules 2-9 under each scale.
      - E. All cone-scales peltate.
        - F. Foliage deciduous (in ours); scales with 2 upright seeds. 11. TAXODIUM
        - FF. Foliage persistent: scales with 5-7 pendulous seeds... 12. SEQUOIA
      - EE. All cone-scales flattened and imbricated.
        - F. Lf. keeled on both sides: scales with 4-5 erect seeds. ... 13. CRYPTOMERIA
        - FF. Lf. flat: scales with 3 pendulous seeds. .... 14. CUNNINGHAMIA
- AA. Cone-scales and lvs. opposite or whorled.
  - B. Fr. berry-like and indehiscent ..... 15. JUNIPERUS
  - BB. Fr. a woody dehiscent cone.
    - C. Scales of cone peltate.
      - D. Seeds 2 under each scale: branchlets flattened. .... 16. CHAMÆCYPARIS
      - DD. Seeds many under each scale: branchlets cylindrical or 4-winged. .... 17. CUPRESSUS
    - CC. Scales of cone flattened and imbricate.
      - D. Seeds 3-5 under each cone-scale. .... 18. THUJOPSIS
      - DD. Seeds 2 under each scale.
        - E. Number of cone-scales 4 or 6. .... 19. LIBOCEDRUS
        - EE. Number of cone-scales 8-12 (sometimes 6). .... 20. THUYA

1. PINUS, L. PINE. Evergreen trees, of about 70 genera in the northern hemisphere.—Winter-buds covered with imbricate scales: lvs. of two kinds, the primary ones scale-like and deciduous, bearing in their axils the secondary linear lvs. in fascicles of 2-5 (rarely reduced to 1), surrounded at base by sheaths of bud-scales: staminate fls. axillary, clustered at base of young shoots, catkin-like, yellow, orange, or scarlet, composed of numerous spirally arranged 2-celled anthers with connective enlarged and scale-like at apex; pistillate fls. lateral or subterminal, greenish or purplish, of numerous spirally arranged scales in the axils of small bracts, each bearing 2 ovules inside: cone subglobose to cylindric, with woody imbricated persistent scales; the exposed part of the scale is called the apophysis, the umbo or elevation being either dorsal or terminal. (Pi-nus: classical Latin name.)—Aside from the following, many native species are planted, but these should be sought in the local manuals.



- A. Fascicles containing 5 lvs.  
 B. Young branchlets tomentose; seeds wingless..... 1. *P. Cembra*  
 BB. Young branchlets glabrous or slightly puberulous; seeds with long wing.  
 c. Lvs. 6-8 in. long; young branchlets glaucous..... 2. *P. excelsa*  
 cc. Lvs. 2-5 in. long; branchlets not glaucous..... 3. *P. Strobus*  
 AA. Fascicles containing 3 lvs.  
 B. Lvs. 8-18 in. long, slender and drooping..... 4. *P. canariensis*  
 BB. Lvs. 4-6 in. long, stiff and straight..... 5. *P. radiata*  
 AAA. Fascicles containing 2 lvs. (rarely 3).  
 B. Lvs. 1½-3 in. long.  
 c. Cones short-stalked; lvs. bluish- or grayish-green..... 6. *P. sylvestris*  
 cc. Cones subsessile; lvs. bright green..... 7. *P. Mugo*  
 BB. Lvs. 3 in. and more long.  
 c. Young branchlets bloomy. (glaucous)..... 8. *P. densiflora*  
 cc. Young branchlets not bloomy.  
 D. Cones deciduous.  
 E. Bark of 2-4-year-old branchlets divided into conspicuous sharply defined plates, each peeling off as a whole.  
 F. Winter-buds brown, resinous..... 9. *P. nigra*  
 FF. Winter-buds grayish-white, not resinous..... 10. *P. Thunbergii*  
 EE. Bark of 2-4-year-old branchlets not conspicuously divided into plates, peeling off irregularly..... 11. *P. Massoniana*  
 DD. Cones tenaciously persistent.  
 E. Length of lvs. usually about 4 in..... 12. *P. halepensis*  
 EE. Length of lvs. 5-9 in.  
 F. Wing of seed very short..... 13. *P. Pinea*  
 FF. Wing of seed very long..... 14. *P. Pinaster*

1. *P. Cembra*, L. SWISS STONE PINE. Tree to 100 ft. or more high, of pyramidal habit when young; bark of old trunks reddish-gray and divided into thin scaly flakes; branchlets brownish-tomentose; winter-buds globose-ovoid, long-acuminate; lvs. in fascicles of 5, 2-5 in. long, triangular with serrulate margins, the sheaths deciduous; cones ovoid, 2-3½ in. long, short-stalked, light brown, indehiscent and deciduous at maturity; cone-scales with terminal umbo; seeds wingless, ½ in. long. (*Cembra*: native Italian name.) Alps of Cent. Eu. to Mongolia.

2. *P. excelsa*, Wall. HIMALAYAN PINE. Tree to 150 ft. high, with grayish-brown bark which is fissured into small plates; branchlets glabrous and glaucous; winter-buds cylindric-ovoid, acute; lvs. in fascicles of 5, 6-8 in. long, slender and drooping, minutely serrulate, grayish- or bluish-green, the sheaths deciduous; cones cylindric, 6-10 in. long, on stalks 1-2 in. long, dehiscent; scales with terminal umbo; seeds ½ in. long, with long wing. Himalayas.

3. *P. Strobus*, L. WHITE PINE. Tree to 150 ft., with horizontal branches in regular whorls and shallowly fissured bark; branchlets glabrous or slightly puberulous; winter-buds ovoid, acuminate; lvs. in fascicles of 5, 2-5 in. long, minutely serrulate, soft bluish-green, the sheaths deciduous; cones cylindric, slender and often curved, 4-8 in. long, on stalks ½-1 in. long, dehiscent; scales with terminal umbo; seeds ½ in. long, with wing about 1 in. long. E. N. Amer.—There are dwarf and columnar forms. Sometimes separated into the genus *Strobus*, which is an old substantive.

4. *P. canariensis*, C. Smith. Tree to 80 ft. tall, the st. and branches usually with scattered short leafy branchlets; bark reddish, slightly fissured; winter-buds oblong, not resinous, with reflexed white-fringed scales; lvs. in fascicles of 3, slender and drooping, 8-18 in. long, minutely serrulate, light green and lustrous, the sheaths persistent; cones cylindric-ovoid, 4-8 in. long, the broad-pyramidal scales with dorsal obtuse umbo; seeds ½ in. long, with long wing adnate to the nut. Canary Isls.

5. *P. radiata*, Don (*P. insignis*, Dougl.). MONTEREY PINE. Tree to 100 ft. high, with thick deeply furrowed red-brown bark and yellowish-brown branchlets; winter-buds ovoid, bright chestnut-brown; lvs. in fascicles of 3, 4-6 in. long, minutely serrulate, grass-green, the sheaths persistent; cones ovoid, 3-7 in. long, short-stalked, persistent and often remaining closed on the branches for many years, umbo dorsal and with minute prickles; seeds ¼ in. long, black, winged. S. to Lower Calif.

6. *P. sylvestris*, L. SCOTCH PINE. Tree to 100 ft. or more high, with smooth bright red bark which becomes fissured at base; winter-buds oblong-ovoid, brown, resinous; lvs. in fascicles of 2, 1½-3 in. long, minutely serrulate, rigid and twisted, bluish- or grayish-green, the sheaths persistent; cones conical, 1-2½ in. long, short-stalked, deciduous, with dorsal obtuse gray umbo; seeds ½ in. long, with long membranaceous wing. Eu., W. Asia.—There are pyramidal and dwarf forms.



7. *P. Mugo*, Turra (*P. montana*, Mill.). SWISS MOUNTAIN PINE. Low prostrate shrub or pyramidal tree to 40 ft. high; winter-buds resinous; lvs. in fascicles of 2, 1-3 in. long, stiff and twisted, bright green, the sheaths persistent; cones ovoid,  $3\frac{1}{4}$ -2 $\frac{1}{2}$  in. long, nearly sessile, deciduous, with dorsal light gray umbo. (Mugo: vernacular Swiss or Italian name.) Mts. of Cent. and S. Eu.—Var. *Mughus*, Zenari (*P. montana* var. *Mughus*, Willk.), is a shrubby prostrate form, and var. *rostrata*, Hoopes (*P. montana* var. *uncinata*, Willk.), a tree to 80 ft. tall.

8. *P. densiflora*, Sieb. & Zucc. (*P. Massoniana*, Hort., not Lamb.). JAPANESE RED PINE. Tree to 100 ft. tall, with sealy orange-red bark, the young branchlets orange-yellow and bloomy; winter-buds oblong-ovoid, resinous; lvs. in fascicles of 2, 3-5 in. long, slender and bright green, minutely serrulate, the sheaths persistent; cones conical, about 2 in. long, short-stalked, deciduous, with small dorsal umbo; seeds about  $\frac{1}{4}$  in. long, with long wing. Japan.—There are dwarf forms and vars. with pendulous branches and yellow foliage.

9. *P. nigra*, Arnold (*P. Laricio*, Poir.). AUSTRIAN PINE. Tree to 100 ft. high, with bark deeply fissured into sealy plates; branchlets light brown; winter-buds ovoid, resinous; lvs. in fascicles of 2, 3-7 in. long, minutely serrulate, dark green, with persistent sheaths about  $\frac{1}{2}$  in. long; cones ovate, 2-3 $\frac{1}{2}$  in. long, sessile, yellowish-brown, deciduous, with flattened dorsal umbo; seeds  $\frac{1}{4}$  in. long, with long wing. S. Eu., W. Asia.—Var. *austriaca*, Aschers. & Graebn. (*P. nigricans*, Hort.). Broad-headed tree with dark gray bark and dark green lvs. 3-4 in. long. S. E. Eu. There are several geographical and hort. forms.

10. *P. Thunbergii*, Parl. JAPANESE BLACK PINE. Tree to 100 ft. or more high, with broad pyramidal head and blackish-gray bark fissured into irregular plates; branchlets orange-yellow; winter-buds oblong, grayish- or silvery-white, not resinous; lvs. in fascicles of 2, 3-4 $\frac{1}{2}$  in. long, stiff, bright green, the persistent sheaths to  $\frac{1}{2}$  in. long; cones conic-ovate, 2-3 in. long, grayish-brown, short-stalked, with small dorsal umbo; seeds  $\frac{1}{4}$  in. long, with long wing. (For Karl Peter Thunberg, page 699.) Japan.

11. *P. Massoniana*, Lamb. Tree to 80 ft. high, with red bark peeling off in strips, at base of trunk dark gray and deeply fissured; branchlets yellowish-brown; lvs. in fascicles of 2, 5-8 in. long, light green, the sheaths persistent; cones oblong-ovoid, 2-3 in. long, brown, deciduous, with small unarmed dorsal umbo; seeds  $\frac{1}{4}$  in. long, with long wing. (Named for Francis Masson, 1741-1805, British collector.) China.

12. *P. halepensis*, Mill. ALEPPO PINE. Tree to 60 ft. high, with short branches and yellowish or brownish branchlets; bark gray and smooth becoming fissured; winter-buds small, not resinous; lvs. in fascicles of 2 or sometimes 3, 2 $\frac{1}{2}$ -4 in. long, light green, the sheaths persistent; cones spreading or deflexed, 2 $\frac{1}{2}$ -3 $\frac{1}{2}$  in. long, stalked, persistent for several years, with unarmed scales and dorsal umbo; seeds  $\frac{1}{4}$  in. long, with long wings. Medit. region.

13. *P. Pinea*, L. ITALIAN STONE PINE. Tree to 80 ft. high, with broad flattened head and brown bark which is smooth at first but becoming deeply furrowed and sealy; winter-buds not resinous, with revolute scales; lvs. in fascicles of 2, 5-8 in. long, rigid, bright green, the sheaths persistent; cones ovoid, 4-5 $\frac{1}{2}$  in. long, chestnut-brown, maturing the third year, with flat obtuse dorsal umbo; seeds  $\frac{3}{4}$  in. long, with short deciduous wing. (*Pinea*: Latin for pine-cone.) Medit. region.

14. *P. Pinaster*, Ait. (*P. maritima*, Poir.). CLUSTER PINE. Tree to 100 ft. high, with pyramidal head and deeply fissured bark; winter-buds oblong-oval, brown, not resinous; lvs. in fascicles of 2, 5-9 in. long, stiff and usually twisted, glossy green, the sheaths persistent; cones oblong, clustered, 4-7 in. long, short-stalked, persistent, with prominent dorsal umbo; seeds  $\frac{1}{2}$  in. long, with long wing. (*Pinaster*: Latin for a wild pine.) S. Eu., N. Afr.

2. *CEDRUS*, Loud. CEDAR. Three large evergreen trees from N. Afr. and Asia.—Bark dark gray, at first smooth but thick and fissured on old trees; lvs. alternate, or fascicled on the spurs, quadrangular and stiff; staminate fls. upright, cylindric, about 2 in. long, terminal on spurs; pistillate fls. ovoid, purplish, about  $\frac{1}{2}$  in. long, consisting of numerous 2-ovuled scales subtended by small bracts; cones ovoid to ovoid-oblong, with broad closely imbricated scales; seeds with large membranaceous wings. (Ced-rus: from *kedros*, the ancient Greek name.)

Leading shoot upright or nodding, the branchlets rarely pendulous: cones truncate and often concave at apex.

Lvs. usually  $1-1\frac{1}{4}$  in. long: branchlets glabrous or only slightly pubescent.....

Lvs. usually less than 1 in. long: branchlets densely pubescent.....

Leading shoot and branchlets pendulous: cones rounded at apex.....

1. *C. libani*

2. *C. atlantica*

3. *C. Deodara*

1. **C. libani**, Loud. CEDAR OF LEBANON (whence the name *libani*). Tree to 120 ft. high, with wide-spreading horizontal branches, the leading shoot nodding; branchlets glabrous or slightly pubescent: lvs.  $1-1\frac{1}{4}$  in. long, broader than thick: cones brown,  $3-4$  in. long. Asia Minor.—There is a var. with shorter lvs. and one with silvery foliage.

2. **C. atlantica**, Manetti. ATLAS CEDAR. Pyramidal tree to 120 ft. high, the leading shoot upright; branchlets densely short-pubescent: lvs. less than 1 in. long, usually higher than broad, pale or bluish-green: cones light brown,  $2-3$  in. long. Atlas Mts. of Algeria.—There are kinds with glaucous foliage.

3. **C. Deodara**, Loud. DEODAR CEDAR. Tree to 150 ft. and more high, with the leading shoot and branchlets pendulous; branchlets densely pubescent: lvs.  $1-2$  in. long, as thick as broad, dark bluish-green: cones reddish-brown,  $3\frac{1}{2}-5$  in. long. (Deodara: native name.) Himalayas.—The foliage varies to yellow and silvery-white.

3. **LARIX**, Mill. LARCH. Deciduous resinous trees of about 10 species in the colder regions of the northern hemisphere.—Branches irregularly whorled and spreading; bark thick, furrowed, and scaly: lvs. linear, spirally arranged or in crowded clusters on short spurs: fls. solitary and terminal, the staminate yellow, globose to oblong, composed of numerous short-stalked spirally arranged anthers; pistillate fls. oblong, consisting of several or many scales borne in the axil of a much longer bract, each scale with 2 naked ovules at base: cones ovoid-oblong to subglobose, short-stalked, of woody persistent scales; seeds with large thin wings. (La-rix: ancient Latin name.)

Lvs. with 2 white bands beneath: cone-scales reflexed at apex.....

Lvs. without conspicuous white bands beneath: cone-scales straight.....

1. *L. Kämpfer*

2. *L. decidua*

1. **L. Kämpferi**, Sarg. (*L. leptolepis*, Murr.). JAPANESE LARCH. Tree to 90 ft. high, with short horizontal branches and gray bark peeling off in narrow strips, the glabrous branchlets yellowish- or reddish-brown: lvs.  $\frac{1}{2}-1\frac{1}{2}$  in. long and  $\frac{1}{2}$  in. or less wide, soft, bluish-green, with 2 white bands beneath: cones ovoid-oblong,  $\frac{1}{2}-1\frac{1}{2}$  in. long, with ovate rounded emarginate scales reflexed at tip. (Named for Engelbert Kämpfer, 1631-1716, traveler in the Orient.) Japan.

2. **L. decidua**, Mill. (*L. europæa*, DC. *L. Larix*, Karst.). EUROPEAN LARCH. Tree to 100 ft. or more high, with dark grayish-brown bark and slender glabrous yellowish branchlets: lvs. triangular,  $\frac{3}{4}-1\frac{1}{4}$  in. long, bright green: cones  $\frac{3}{4}-1\frac{1}{2}$  in. long, the rounded orbicular scales straight and often pubescent on back. N. and Cent. Eu.—There is a pendulous form.

4. **PSEUDOLARIX**, Gord. GOLDEN-LARCH. One deciduous resinous tree native in E. China, differing from *Larix* in the staminate fls. being clustered and pendulous and in the deciduous cone-scales. (*Pseudola-rix*: false *Larix*.)

**P. amabilis**, Rehd. (*P. Kämpferi*, Gord. *P. Fortunei*, Mayr). Tree to 130 ft. high, with horizontally spreading branches and reddish-brown bark: lvs. linear,  $1\frac{1}{2}-3$  in. long and  $\frac{1}{8}-\frac{1}{4}$  in. wide, bluish-green beneath: cones ovate,  $2\frac{1}{2}-3$  in. long, reddish-brown, with triangular emarginate deciduous scales.—There is a dwarf form.

5. **ABIES**, Mill. FIR. Evergreen trees of pyramidal habit, of about 35 species in the northern hemisphere.—Branches whorled and spreading; bark smooth and thin on young trees, often thick and furrowed when old: lvs. linear to linear-lanceolate, entire, sessile, flattened and usually grooved above, keeled beneath and with 2 white or pale stomatic bands, rarely 4-sided, with 2 resin-canals, spirally arranged but often appearing 2-ranked by a twist at their base: fls. axillary, in early spring from buds formed the previous season on branchlets of the year, surrounded at base by involucre of enlarged bud-

scales; staminate fls. pendent on branches above middle of tree, with yellow or scarlet anthers; pistillate fls. erect on topmost branches, with numerous 2-ovuled imbricated scales: cones erect, ovoid or oblong-cylindric, scales deciduous, longer or shorter than their bracts, narrowed at base into long stipe; seeds with large thin wing. (A-bies: ancient Latin name.)

- A. Lvs. without stomata above.  
 B. Apex of lvs. acute, sharp-pointed..... 1. *A. cephalonica*  
 BB. Apex of lvs. rounded or emarginate.  
 C. Branchlets glabrous.  
 D. Cones 4 in. long; branchlets deeply grooved..... 2. *A. homolepis*  
 DD. Cones 5-7 in. long; branchlets not grooved..... 3. *A. numidica*  
 CC. Branchlets pubescent.  
 D. Buds very resinous; cones  $1\frac{3}{4}$ - $2\frac{1}{2}$  in. long..... 4. *A. Veitchii*  
 DD. Buds not or only slightly resinous; cones 4-9 in. long.  
 E. Bracts of cone-scales hidden..... 5. *A. cilicica*  
 EE. Bracts of cone-scales exerted.  
 F. Emarginate tips of lvs. pungent-pointed; bracts of scales not reflexed..... 6. *A. firma*  
 FF. Emarginate tips of lvs. obtuse; bracts of scales reflexed.  
 G. Lvs. pectinate, i. e., lvs. 2-ranked or nearly so and wide-spreading..... 7. *A. alba*  
 GG. Lvs. not pectinate, i. e., more or less imbricate or overlapping..... 8. *A. Nordmanniana*  
 AA. Lvs. with stomata on both sides.  
 B. Length of lvs. about  $\frac{3}{4}$  in..... 9. *A. Pinsapo*  
 BB. Length of lvs.  $1\frac{1}{4}$ -2 in..... 10. *A. concolor*

1. *A. cephalonica*, Loud. GREEK FIR. Tree to 100 ft. high, with grayish-brown bark and lustrous red brown glabrous branchlets; winter-buds reddish, resinous; lvs. linear,  $\frac{1}{2}$ -1 in. long, acuminate into a sharp point, radially spreading and slightly directed forward, deep green above with 2 white bands beneath; cones cylindric, 5-7 in. long, brownish; bracts exerted and reflexed. Greece.

2. *A. homolepis*, Sieb. & Zucc. (*A. brachyphylla*, Maxim.). NIKKO FIR. Tree to 120 ft. high, with grayish, glabrous, deeply grooved branchlets; winter-buds resinous; lvs. linear, about 1 in. long, rounded and slightly bifid at apex, spreading outward and upward, shining dark green above with 2 white bands beneath; cones cylindric, about 4 in. long, narrowed at ends, purple becoming brown; bracts hidden. Japan.

3. *A. numidica*, De Lahnoy. ALGERIAN FIR. Tree to 60 ft. tall, with gray bark and glabrous and lustrous branchlets; winter-buds not or slightly resinous; lvs. linear, to  $\frac{3}{4}$  in. long, rounded or emarginate at apex, much crowded and spreading outward and upward, dark green above with 2 white bands beneath; cones cylindric, 5-7 in. long, brown; bracts hidden. N. Afr.

4. *A. Veitchii*, Murr. Tree to 80 ft., with grayish bark and brown densely pubescent branchlets; winter-buds purplish, very resinous; lvs. linear,  $\frac{1}{2}$ -1 in. long, truncate and notched at apex, crowded and directed forward and more or less upward, lustrous dark green above and with 2 broad silvery-white bands beneath; cones cylindric,  $1\frac{1}{4}$ - $2\frac{1}{2}$  in. long, at first bluish-purple; bracts slightly exerted and reflexed. Cent. Japan, where it was discovered by John Gould Veitch in 1860.

5. *A. cilicica*, Carr. CILICIAN FIR. Tree to 100 ft., with ashy-gray bark and gray slightly pubescent branchlets; winter-buds not resinous; lvs. linear, about 1 in. long, rounded or notched at apex, spreading upward and forward, shining dark green above with 2 narrow white bands beneath; cones cylindric, 7-9 in. long, reddish-brown; bracts hidden. Asia Minor, Syria.

6. *A. firma*, Sieb. & Zucc. MOMI FIR. Tree to 120 ft., with dark gray bark and brownish slightly grooved branchlets which are pubescent in the grooves; winter-buds only slightly resinous; lvs. linear, to  $1\frac{1}{2}$  in. long, the apex bifid and pungent-pointed or on older plants obtuse and emarginate, lustrous dark green above with grayish bands beneath, pectinate; cones cylindric, 4-5 in. long, yellowish-green before maturity; bracts exerted, not reflexed. Japan.

7. *A. alba*, Mill. (*A. pectinata*, DC. *A. Picca*, Lindl.). SILVER FIR. Tree to 150 ft., with grayish bark and gray slightly pubescent branchlets; winter-buds not resinous; lvs. linear, to  $1\frac{1}{4}$  in. long, rounded and notched at apex, pectinate, lustrous dark green above with 2 white bands beneath; cones cylindric, 4-5  $\frac{1}{2}$  in. long, green becoming reddish brown; bracts exerted and reflexed. Mts. of Cent. and S. Eu.—There are pendulous and pyramidal forms.

8. *A. Nordmanniana*, Spach. Tree to 150 ft. or more, with grayish-brown bark and gray slightly pubescent branchlets; winter-buds not resinous; lvs. linear,  $\frac{3}{4}$ -

1½ in. long, rounded and notched at apex, directed forward and densely covering the branchlets, lustrous dark green above with whitish bands beneath: cones cylindric, 5-6 in. long, reddish-brown; bracts exserted and reflexed. (Named for Alexander Nordmann, Finnish botanist, who discovered it in 1837.) Caucasus, Asia Minor, Greece.—There are vars. with yellow and twisted foliage.

9. *A. Pinsapo*, Boiss. SPANISH FIR. Tree to 80 ft., with glabrous brownish branchlets; winter-buds resinous; lvs. linear, to ¾ in. long, acute or obtuse, thick and rigid and radially spreading at nearly right angles, dark green and stomatiferous above, with grayish bands beneath: cones cylindric, 4-5 in. long, purplish-brown; bracts hidden. (Pinsapo: native Spanish name.) Spain.—Vars. have silvery or glaucous foliage.

10. *A. concolor*, Lindl. & Gord. WHITE FIR. Tree to 120 ft., with gray bark and yellowish-green nearly glabrous branchlets; winter-buds resinous; lvs. irregularly arranged, linear, 1½-2 in. long, acute or rounded at apex, bluish-green and stomatiferous above, with pale bands beneath: cones cylindric, 3-5 in. long, greenish or purplish becoming brown; bracts hidden. Colo. to N. Mex.—There is a var. of globose habit and forms with silvery or yellowish foliage.

6. *PICEA*, A. Dietr. SPRUCE. Nearly 40 species of evergreen pyramidal trees, native in cold and temp. regions of the northern hemisphere.—Branches usually whorled, the branchlets roughened by the persistent lf.-bases; bark thin and scaly: lvs. linear, spirally arranged, usually 4-angled with rows of stomata on all sides, or sometimes compressed and with stomata on only the upper or ventral side, sessile and jointed at base to a stalk-like woody projection; fls. terminal or axillary, catkin-like; staminate fls. yellow or red, consisting of numerous spirally arranged anthers with connective enlarged at apex and scale-like; pistillate fls. greenish or purple, of spirally arranged 2-ovuled scales each subtended by a small bract: cones ovoid or oblong, cylindric, pendulous or spreading, the scales persistent; seeds with large thin wing. (Pi-*cea*, Pic-*ea*: ancient Latin name.)

- A. Lvs. flattened, with white bands above but without stomata below. . . . . 1. *P. Omorika*
- AA. Lvs. quadrangular, with stomatic lines on all 4 sides. . . . . 2. *P. Smithiana*
- B. Length of lvs. 1-2 in. . . . . "
- BB. Length of lvs. 1 in. or less. . . . . "
- C. Branchlets glabrous. . . . . 3. *P. glauca*
- D. Cones 2 in. or less long. . . . . 4. *P. Abies*
- DD. Cones 2½-7 in. long. . . . . 5. *P. polita*
- E. Pistillate fls. bright purple: lvs. pointing forward. . . . . 6. *P. pungens*
- EE. Pistillate fls. green: lvs. radially spreading at nearly right angles. . . . . 7. *P. orientalis*
- F. Winter-buds dark brown: lvs. dark green. . . . . 8. *P. Koyamai*
- FF. Winter-buds light yellowish-brown: lvs. bluish-green. . . . . 9. *P. Engelmann*
- CC. Branchlets pubescent. . . . . 10. *P. bicolor*
- D. Tips of lvs. obtuse: margins of cone-scales entire. . . . . 4. *P. Abies*
- DD. Tips of lvs. acute or acuminate: margins of cone-scales denticulate. . . . . 8. *P. Koyamai*
- E. Cones 4-7 in. long. . . . . 9. *P. Engelmann*
- EE. Cones less than 4 in. long. . . . . 10. *P. bicolor*
- F. Lvs. ½ in. or less long. . . . . 9. *P. Engelmann*
- FF. Lvs. to 1 in. long. . . . . 10. *P. bicolor*
- G. Length of cone about 2 in.: lvs. bluish-green. . . . . 9. *P. Engelmann*
- GG. Length of cone 3-4 in.: lvs. dark green, slightly compressed. . . . . 10. *P. bicolor*

1. *P. Omorika*, Bolle. SERVIAN SPRUCE. Tree to 100 ft., with narrow pyramidal head and short, pendent, brown, pubescent branchlets; bark brown; winter-buds dark brown, not resinous: lvs. flattened, ½-¾ in. long, ridged on both sides, with whitish bands above but without stomata below, obtuse and mucronulate: fls. purple: cones ovate-oblong, 1½-2½ in. long, brown and glossy; margin of scales finely denticulate. (Omorika: vernacular name.) S. E. Eu.

2. *P. Smithiana*, Boiss. HIMALAYAN SPRUCE. Tree to 150 ft., with wide-spreading branches and slender, pendulous, gray, glabrous and lustrous branchlets; bark brownish-gray; winter-buds acute: lvs. radially disposed and pointing forward, usually higher than broad, 1-2 in. long; pistillate fls. purple: cones dark brown and glossy, 5-7 in. long; scales with entire margin. (Bears the name of Sir James Edward Smith, 1759-1828, first president of the Linnean Society.) Himalayas.



3. *P. glauca*, Voss (*P. canadensis*, BSP. *P. alba*, Link). WHITE SPRUCE. Tree to 70 ft. or more high, with ascending branches and usually pendent, grayish or pale brown, glabrous branchlets; bark grayish; winter-buds obtuse, with loosely imbricated scales bifid at apex: lvs. quadrangular,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, acute, bluish-green; cones oblong-cylindric,  $1\frac{1}{2}$ –2 in. long, pale brown and lustrous; scales with entire margin. Lab. to Alaska, south to Mont. and N. Y.—Var. *albertiana*, Sarg. ALBERTA SPRUCE. Tree to 15 ft., of narrow pyramidal habit, the branchlets sometimes slightly pubescent; winter-buds with entire scales: cones shorter, the scales slightly denticulate. The Black Hills spruce belongs here. There are dwarf forms and vars. with yellow and silvery foliage.

4. *P. Abies*, Karst. (*P. excelsa*, Link. *Pinus Abies*, L.). NORWAY SPRUCE. Tree to 150 ft., with spreading branches and usually pendulous, brown, glabrous or pubescent branchlets; bark reddish-brown; winter-buds reddish or light brown, not resinous: lvs. quadrangular,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, spirally crowded around the branchlets, those on upper side pointing forward, acute, dark green and usually shining; pistillate fls. bright purple: cones oblong-cylindric, 4–7 in. long, light brown; scales with erose-denticulate margin. Cent. and N. Eu.—Runs into numerous hort. forms: those with various colored lvs., as var. *finedonensis*, Nash; of pyramidal or columnar habit; with pendulous branchlets; of low pyramidal to subglobose or depressed habit, as vars. *Clanbrasiliana*, Th. Fries, *Gregoryana*, Nash, *Merkii*, Rehd., *Maxwellii*, Nash, *Ellwangeriana*, Rehd.; others with green or purple cones.

5. *P. polita*, Carr. TIGERTAIL SPRUCE. Pyramidal tree to 90 ft. high, of stiff habit; branchlets yellowish-brown, glabrous; winter-buds dark brown, acute: lvs. thick,  $\frac{1}{2}$ –1 in. long, radially spreading, higher than broad, spiny-tipped, shining dark green; pistillate fls. green: cones oblong, 4–5 in. long, brown and glossy; scales with finely denticulate margins. Japan.

6. *P. pungens*, Engelm. COLORADO SPRUCE. Pyramidal tree to 150 ft., with stiff horizontal branches and yellowish-brown glabrous branchlets; winter-buds light yellowish-brown: lvs. quadrangular,  $\frac{3}{4}$ –1 in. long, radially spreading, rigid and spiny-tipped, bluish-green to silvery-white: cones oblong-cylindric,  $2\frac{1}{2}$ –4 in. long, light brown and glossy; scales flexuose on margins, erose at apex. Wyo. to New Mex.—Var. *Kosteriana*, Mast., has bluish-white foliage and pendulous branches; originated in Koster nurseries in Holland. There is also a dwarf form.

7. *P. orientalis*, Carr. ORIENTAL SPRUCE. Tree to 100 ft. or more high, with brown bark and somewhat pendulous, brown, pubescent branchlets; winter-buds brown, acute: lvs. crowded and more or less appressed to the branches,  $\frac{1}{4}$ – $\frac{2}{5}$  in. long, obtuse, thick, dark green and shining; fls. carmine: cones ovate-cylindric,  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. long; scales entire at margins. Caucasus, Asia Minor.—There is a dwarf form and one with yellow branchlets.

8. *P. Koyamai*, Shiras. Narrow pyramidal tree to 60 ft., with grayish-brown bark and reddish-brown glandular-pubescent branchlets; winter-buds brown, resinous: lvs. quadrangular, slightly flattened,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long, acute: cones oblong-cylindric, 2–4 in. long, pale brown; scales denticulate. (Koyamai: Japanese name.) Japan.

9. *P. Engelmanni*, Engelm. Tree to 150 ft., with slender spreading branches and brownish-yellow pubescent branchlets; winter-buds brownish-yellow: lvs. more or less directed forward,  $\frac{1}{2}$ –1 in. long, acute, bluish-green to steel-blue, with strong odor when bruised; fls. purple: cones oblong-cylindric to oval,  $1\frac{1}{2}$ –3 in. long, light brown; margins of scales erose-denticulate. (Named for Geo. Engelmann, 1809–1884, American botanist.) B. C. to New Mex.

10. *P. bicolor*, Mayr (*P. Alcockiana*, Carr., partly). ALCOCK SPRUCE. Tree to 150 ft., with stiff branches and yellowish-brown pubescent or sometimes glabrous branchlets; winter-buds brown, slightly resinous: lvs. quadrangular, slightly flattened,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, sharply acuminate: cones oblong, 3–4 in. long, purple becoming brown; scales finely denticulate. Japan.

7. TSUGA, Carr. HEMLOCK. Evergreen trees of 9 species in temp. N. Amer., Japan, China, and E. Himalayas.—Branches slender and horizontal, with cinnamon-red furrowed bark; winter-buds minute, not resinous: lvs. linear, flat or angular, short-petioled, usually 2-ranked, having only 1 resin-duct in middle of lf.: fls. solitary; staminate of numerous anthers with connectives produced into gland-like tips; pistillate fls. terminal, the 2-ovuled scales about as long as bracts: cones ovate or oblong, pendulous, with thin entire scales much longer than bracts; seeds winged. (Tsu-ga: Japanese name.)



- Margin of lvs. finely denticulate, at least toward the apex..... 1. *T. canadensis*  
 Margin of lvs. entire.  
 Branchlets glabrous..... 2. *T. Sieboldii*  
 Branchlets pubescent.  
 Cones  $\frac{3}{4}$ – $\frac{3}{4}$  in. long: lvs. emarginate at apex..... 3. *T. diversifolia*  
 Cones 1– $1\frac{1}{2}$  in. long: lvs. rounded or only slightly emarginate at apex..... 4. *T. caroliniana*

1. *T. canadensis*, Carr. CANADIAN HEMLOCK. Tree to 100 ft., with horizontal or pendulous branches and yellowish-brown pubescent branchlets: lvs.  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, obtuse or acutish, the margins finely denticulate, dark green and obscurely grooved above, with 2 whitish bands beneath: cones ovoid,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, on slender stalks, the scales nearly orbicular. N. S. to Ala.—Runs into dwarf and pendulous forms and vars. with shorter lvs. and white-tipped branchlets.

2. *T. Sieboldii*, Carr. Tree to 100 ft., with slender spreading branches and pale yellowish-brown glabrous and glossy branchlets: lvs. usually broadest at the emarginate apex,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, dark green and grooved above, with narrow white bands beneath: cones ovoid, 1– $1\frac{1}{4}$  in. long, stalked, with orbicular scales. (Named for Philipp Franz von Siebold, 1796–1866, German botanist.) Japan.

3. *T. diversifolia*, Mast. JAPANESE HEMLOCK. Tree to 80 ft. high, with reddish-brown pubescent branchlets: lvs. broadest at middle or toward base,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, emarginate at apex: cones  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, short-stalked, the scales orbicular-ovate. Japan.

4. *T. caroliniana*, Engelm. CAROLINA HEMLOCK. Tree to 70 ft. high, with handsome pyramidal head and often pendulous branches; branchlets reddish-brown, pubescent becoming glabrous: lvs.  $\frac{1}{3}$ – $\frac{3}{4}$  in. long, obtuse or only slightly emarginate at apex, dark green and glossy above, with white bands beneath: cones oblong, 1  $\frac{1}{2}$  in. long, short-stalked, the scales oblong. Mts. S. W. Va. to N. Ga.

8. *PSEUDOTSUGA*, Carr. Four evergreen trees native in W. N. Amer., Japan, and China.—Branches irregularly whorled, the nearly smooth branchlets marked with oval scars where the lvs. have fallen; winter-buds acute, not resinous: lvs. linear, flattened, more or less 2-ranked, grooved above, with white bands beneath on each side of the prominent midrib: fls. solitary, the staminate axillary, with numerous anthers, their connectives ending in short spurs; pistillate fls. terminal, of spirally arranged ovate scales shorter than bracts: cones ovate-oblong, pendulous, the scales persistent; bracts longer than scales, 2-lobed at apex with midrib produced into rigid awn; seeds winged. (*Pseudotsuga*—*false Tsuga*.)

*P. taxifolia*, Britt. (*P. Douglasii*, Carr.). DOUGLAS FIR. Tree to 200 ft. or more high, with dark red-brown bark and horizontal branches with pendulous branchlets: lvs.  $\frac{3}{4}$ – $1\frac{1}{4}$  in. long, obtuse: staminate catkins orange, pistillate reddish: cones 2  $\frac{1}{2}$  in. long, the bracts much exserted. B. C. to N. Mex. and Colo.—There are forms with glaucous and silvery foliage and of dwarf, pyramidal, and pendulous habit.

9. *SCIADOPITYS*, Sieb. & Zucc. One Japanese evergreen tree of narrow pyramidal habit and dense growth.—Lvs. of two kinds, one small, scale-like and scattered but crowded at the ends of the branchlets and bearing in their axils whorls of linear flat lvs. furrowed on each side: staminate fls. in dense clusters at ends of shoots, composed of spirally arranged anthers; pistillate fls. solitary at ends of shoots, of numerous spirally arranged scales bearing 7–9 ovules and subtended by a small bract: cones oblong-ovate, woody, bracts adnate to the thick orbicular scales; seeds with narrow wing. (*Sciadopitys*: Greek for *umbrella* and *pine*.)

*S. verticillata*, Sieb. & Zucc. UMBRELLA-PINE. To 120 ft. high; bark gray to grayish-brown, separating in thin shreds: scale-like lvs.  $\frac{1}{6}$  in. long, dark brown; conspicuous lvs. 3–6 in. long and  $\frac{1}{2}$  in. wide, obtuse and emarginate, dark green and glossy above, with 2 white bands beneath: cones 3–5 in. long. Cent. Japan.

10. *ARAUCARIA*, Juss. Tall evergreen trees of about 12 species in S. Amer., Australia, and Pacific Isls., grown out-of-doors in sub trop. regions and in their

juvenile stage as pot-plants N.—Branches regularly whorled: lvs. spirally arranged, scale-like and stiff and usually closely imbricated or subulate or flattened: mostly dioecious: staminate fls. terminal, solitary or in fascicles, of numerous spirally crowded and imbricated anthers; pistillate fls. in ovoid or globose heads, of many spirally arranged scales each with a single ovule: cones large and woody, the numerous scales 2-edged or 2-winged, shattering at maturity; seeds wingless, adnate to scale at base. (Araucaria: from *Arauco*, a province in S. Chile.)

Lvs. lanceolate, to 2 in. long: cone-scales not winged.

Base of lvs. contracted; lvs. spreading..... 1. *A. Bidwillii*

Base of lvs. broad; lvs. imbricated..... 2. *A. araucana*

Lvs. subulate, to  $\frac{3}{4}$  in. long: cone-scales winged..... 3. *A. excelsa*

1. *A. Bidwillii*, Hook. BUNYA-BUNYA. Tree to 150 ft. high, with the trunk free of branches for about half its height: lvs. lanceolate,  $\frac{3}{4}$ –1½ in. long, very sharp-pointed, contracted at base, spreading in two rows, thick and shining: cone globose-ovoid, about 9 in. long and 7 in. through; scales terminating in an acute edge. (Named for J. C. Bidwill, 1815–1853, botanical explorer.) Australia.

2. *A. araucana*, Koch (*A. imbricata*, Pav.). MONKEY-PUZZLE. Pyramidal tree to 100 ft. high, with spreading upward-curved branches: lvs. ovate-lanceolate, 1–2 in. long, stiff and sharp-pointed, broad at base, imbricated and persisting for many years, bright green on both sides: cones globose-ovoid, 5–8 in. diam.; scales with lanceolate acuminate appendage. Chile.

3. *A. excelsa*, R. Br. NORFOLK-ISLAND-PINE. Tree to 200 ft. high: lvs. subulate,  $\frac{1}{2}$ –¾ in. long, curved and sharp-pointed, those of fertile branches much shorter, compressed, obtusish and densely imbricated: cones subglobose, 4–6 in. diam.; scales terminating in an incurved spine. Norfolk Isl.—The common cult. species; there is a glaucous var. and one with white-tipped branchlets.

11. **TAXODIUM**, Rich. BALD-CYPRESS. Deciduous or evergreen trees, of 1 species in E. N. Amer. and 1 in Mex.—Bark furrowed and scaly: lvs. linear, spirally arranged, usually 2-ranked, deciduous together with the lateral branchlets: staminate fls. catkin-like, in terminal drooping panicles, consisting of spirally arranged anthers; pistillate fls. solitary or in pairs at ends of branchlets of previous year, of imbricated scales bearing 2 erect ovules inside at base: cones globose, short-stalked, of woody scales enlarged at apex into an irregularly 4-sided mucronate disk; seeds winged. (Taxodium: from resemblance to lvs. of *Taxus*.)

*T. distichum*, Rich. COMMON BALD-CYPRESS. Deciduous tree to 150 ft., with trunk attaining 12 ft. diam. and light cinnamon-brown bark; branches erect or spreading, becoming slightly pendulous: lvs.  $\frac{1}{2}$ –¾ in. long, acute, thin and light green: staminate panicles 4–5 in. long, purplish: cones rugose, about 1 in. diam., without mucros. Del. to Fla. and Tex.

12. **SEQUOIA**, Endl. Two evergreen trees native in W. N. Amer., attaining great size.—Bark red, thick, and fibrous: lvs. alternate, linear, subulate or scale-like, often of two kinds: fls. small, solitary; staminate terminal in axils of upper lvs., of numerous spirally arranged stamens; pistillate fls. terminal, composed of many spirally arranged scales each with 5–7 pendulous ovules at base: cones woody, pendulous, persistent, the scales widened into a thickened disk which is depressed in center; seeds winged. (Sequoia: named for Sequoyah, about 1770–1843, a Cherokee half-breed of Ga.)

Lvs. scale-like, adherent to the st..... 1. *S. gigantea*

Lvs. spreading in 2 ranks..... 2. *S. sempervirens*

1. *S. gigantea*, DC. (*S. Washingtonia*, Sudw. *S. Wellingtonia*, Seem.). GIANT SEQUOIA. CALIFORNIA BIG-TREE. Tree to 300 ft. or more tall, with a trunk 10–30 ft. diam., in age usually free of branches for considerable distance, much enlarged and buttressed at base; bark 1–2 ft. thick; branches pendulous, cord-like: lvs. scale-like,  $\frac{1}{8}$ –½ in. long, sharp-pointed, adherent to and densely clothing the

st.: cones ovoid, 2-3½ in. long and 1½-2 in. broad, maturing the second summer, dark reddish-brown. Western slopes of Sierra Nevada, Calif.—There are races with bluish, yellow, and variegated foliage and with pendulous branches.

2. *S. sempervirens*, Endl. REDWOOD. Tree to 340 ft. high, with trunk 10-25 ft. diam. clothed with branches to base or in mature specimens clear of branches for 100 ft., buttressed at base; bark 6-12 in. thick: lvs. linear, 1½-1 in. long, usually with rigid points, spreading in 2 ranks: cone oval, ¾-1 in. long and ½ in. across, maturing the first autumn. N. and Cent. Coast Ranges of S. Ore. to Cent. Calif.—There is a glaucous-leaved var.

13. *CRYPTOMERIA*, D. Don. One evergreen pyramidal tree with a straight slender trunk, native in Japan and possibly China.—Branches whorled and spreading; bark reddish-brown: lvs. spirally arranged, linear-subulate, acute, decurrent at base, slightly curved: staminate fls. axillary, in short terminal racemes, yellow, of numerous spirally arranged anthers; pistillate fls. terminal and solitary, each scale with 4-5 erect ovules: cones globose, with thick wedge-shaped scales with pointed processes at apex and the adnate bracts with recurved points; seeds narrowly winged. (*Cryptomeria*: Greek for *hidden* and *part*; meaning obscure.)

*C. japonica*, D. Don. To 125 ft. high: lvs. ½-1 in. long, bluntly keeled on the dorsal and sharply keeled on the ventral side, bluish-green: cone reddish-brown, ¾-1 in. across.—Runs into many vars., the commonest in cult. being var. *Lobbii*, Carr. (named for Wm. Lobb, collector for Veitch), of more compact habit and more appressed dark green lvs.; and var. *elegans*, Mast., a low form with pendulous branchlets and longer lvs. which turn bronzy-red in autumn.

14. *CUNNINGHAMIA*, R. Br. CHINA-FIR. Two evergreen trees from China and Formosa.—Branches whorled and spreading: lvs. rigid, densely spirally arranged and 2-rowed in direction: fls. in small terminal clusters; staminate fls. oblong, of numerous spirally crowded stamens; pistillate fls. globose, the scales with 3 pendulous ovules: cones roundish-ovate, with leathery serrate and pointed scales; seeds narrowly winged. (*Cunninghamia*: for James Cunningham, who discovered the tree in 1702.)

*C. lanceolata*, Hook. (*C. sinensis*, R. Br.). Tree to 80 ft. high: lvs. linear-lanceolate, 1½-2½ in. long, sharp-pointed, with a broad decurrent base, finely serrate, with 2 broad whitish bands beneath: cones 1-2 in. long. China.

15. *JUNIPERUS*, L. JUNIPER. Evergreen trees or shrubs of about 40 species widely distributed over the world.—Bark thin and shredding: lvs. sessile, needle-like and in whorls of 3 or scale-like and opposite, closely imbricated: diœcious or rarely monœcious: fls. minute, axillary or terminal; staminate fls. solitary, yellow, consisting of numerous anthers united into an ovoid or oblong catkin; pistillate fls. ovoid, greenish, with several bracts bearing 1 or 2 ovules: fr. a berry-like cone formed by the union of the fl-scales. (*Juniperus*: classical name.)

Lvs. needle-shaped.

Base of lvs. jointed: staminate fls. axillary.

Fr. dark brown: lvs. with 2 narrow white bands above.....1. *J. macrocarpa*

Fr. dark blue: lvs. with 1 broad white band above.....2. *J. communis*

Base of lvs. decurrent: staminate fls. terminal.

Fr. 1-seeded: lvs. all needle-shaped.....3. *J. squamata*

Fr. 2-3-seeded: lvs. of two kinds, scale-like and needle-shaped.....4. *J. chinensis* vars.

Lvs. scale-like or both scale-like and needle-shaped.

Color of fr. brown or purplish-brown.

Scale-like lvs. obtuse: fr. 2-3-seeded.....4. *J. chinensis*

Scale-like lvs. acute: fr. 4-6-seeded.....5. *J. excelsa*

Color of fr. bluish, pruinose.

Plant a tree: fr. on erect pedicels.....6. *J. virginiana*

Plant a shrub: fr. pendulous on curved pedicels.

Shrub prostrate: lvs. bluish-green.....7. *J. horizontalis*

Shrub with ascending or spreading branches: lvs. dark green.....8. *J. Sabina*

1. *J. macrocarpa*, Sibth. PLUM JUNIPER. Dense pyramidal shrub or small tree to 12 ft. high: lvs. linear-lanceolate, ½-¾ in. long and about ¼ in. broad, tapering

from base into a spiny point, spreading, with 2 narrow white bands above: fr. dark brown, glaucous,  $\frac{1}{2}$  in. across. *Medit. region.*

2. *J. communis*, L. COMMON JUNIPER. Erect shrub or sometimes tree to 20 ft. and more high: lvs. linear to linear-lanceolate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, tapering from base into sharp point, spreading, with 1 broad white band above, bluntly keeled below: fr. dark blue and glaucous,  $\frac{1}{4}$ – $\frac{1}{3}$  in. across. *Eu., Asia, N. Amer.*—The kinds most common in cult. are: *Var. hibernica*, Gord. IRISH JUNIPER. Narrow columnar form with upright deep green branches and shorter less spreading lvs. *Var. suecica*, Loud. SWEDISH JUNIPER. Narrow columnar form sometimes 40 ft. tall, the bluish-green branches with drooping tips. *Var. depressa*, Pursh. PROSTRATE JUNIPER. Sts. ascending to about 4 ft. *Var. montana*, Ait. MOUNTAIN JUNIPER. Spreading or procumbent shrub to 2 ft. high.

3. *J. squamata*, Lamb. Decumbent or ascending shrub to about 2 ft. high: lvs. linear-lanceolate or lanceolate,  $\frac{1}{2}$ – $\frac{1}{4}$  in. long, loosely appressed, grayish- or bluish-green, with 2 whitish bands above and grooved below: fr. reddish-brown becoming purplish-black,  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, 1-seeded. *Himalayas, W. China.*

4. *J. chinensis*, L. (*J. sinensis*, Hort.). CHINESE JUNIPER. Tree to 60 ft. high or sometimes a procumbent shrub: lvs. of two kinds, the juvenile linear, needle-shaped, pointed and spreading, with 2 white bands above, the adult scale-like, obtuse and appressed: fr. brownish-violet, bloomy,  $\frac{1}{4}$ – $\frac{1}{3}$  in. across, with 2 or 3 seeds. *Himalayas, China, Japan.*—Runs into many color and habit forms, the most important of which are: *Var. Pfizeriana*, Spæth. Branches spreading horizontally, the grayish-green branchlets pendulous. *Var. japonica*, Vilhm. JAPANESE JUNIPER. Low shrub with spreading sometimes procumbent branches and mostly needle-shaped lvs. *Var. fœmina*, Gord. (*J. Reevesiana*, Knight). Branches slender and spreading, lvs. scale-like, bearing pistillate fls. and fr.

5. *J. excelsa*, Bieb. GREEK JUNIPER. Pyramidal tree to 6 ft. tall: lvs. of two kinds, the juvenile needle-shaped,  $\frac{1}{2}$ – $\frac{1}{4}$  in. long, with 2 glaucous bands above, the adult scale-like, closely appressed, acute, dark or bluish-green: fr. dark purplish-brown with bluish bloom, about  $\frac{1}{2}$  in. across, with 4–6 seeds. *Greece, W. Asia.*

6. *J. virginiana*, L. RED-CEDAR. Tree to 100 ft. high: lvs. of two kinds, the juvenile needle-shaped and spiny-pointed,  $\frac{1}{2}$ – $\frac{1}{4}$  in. long, the adult scale-like, acute, appressed: fr. dark blue and glaucous,  $\frac{1}{4}$ – $\frac{1}{2}$  in. across, on erect pedicels. *N. Amer. east of Rocky Mts.*—There are numerous forms distinguished by habit and color. Some of these are: *Var. Canaertii*, Sémécl., a compact pyramidal form with dark green foliage; *var. Schottii*, Gord., small columnar tree with bright green scale-like foliage; *var. Keteleeri*, Hort., compact pyramidal form with ascending branches and dark green scale-like foliage; *var. tripartita*, R. Smith, dwarf spreading densely branched form with glaucous needle-shaped lvs.

7. *J. horizontalis*, Moench. CREEPING JUNIPER. Procumbent shrub with long trailing branches or sometimes to 4 ft. high: lvs. of two kinds, juvenile needle-shaped, adult scale-like, acute, appressed, bluish-green or steel-blue, of slight aromatic odor: fr. blue and slightly glaucous, about  $\frac{1}{2}$  in. across, pendulous on curved pedicels. *N. S. to N. Y., Mont. and B. C.*—*Var. Douglasii*, Rehd., is a trailing form with steel-blue foliage.

8. *J. Sabina*, L. SAVIN. Spreading or procumbent shrub, sometimes to 10 ft. high: lvs. of two kinds, the juvenile needle-shaped, acute and spreading, the adult scale-like, obtuse or acutish, imbricated, dark green, of disagreeable odor when bruised: fr. dark blue and bloomy,  $\frac{1}{2}$ – $\frac{1}{4}$  in. across, pendulous on curved pedicels. (*Sabina*: named from the Sabines, an ancient people of Italy.) *Mts. of Cent. and S. Eu., W. Asia and Caucasus.*—*Var. tamariscifolia*, Ait. Lvs. usually all needle-shaped, bright green with white band above. *Var. cupressifolia*, Ait. Lvs. scale-like, imbricated, often bluish-green. There are also columnar and variegated forms.

16. CHAMÆCYPARIS, Spach. CYPRESS. RETINISPORÆ. Six species of evergreen trees native in N. Amer. and E. Asia.—Bark scaly or fissured; branchlets flattened: lvs. scale-like, opposite in pairs, densely clothing the branchlets, in juvenile state needle-shaped: fls. minute, terminal, the two sexes on separate branches; staminate oblong, yellow or red, of numerous decussate stamens; pistillate fls. globose, the scales with 2, rarely 5, erect ovules: cones erect, globose, maturing the first year, with 6–11 bracts and peltate scales; seeds winged. (*Chamæcyparis*: Greek for dwarf or on the ground and cypress.)—Nos. 3 and 4 are the *retinisporas* (or *retinosporas*) of plantations, although the name is applied also to juvenile states of *Thuja*.



Lateral lvs. about same size as facial ones.

Lvs. with a conspicuous gland on back:.....1. *C. thyoides*

Lvs. without conspicuous glands.

Branchlets terete or slightly flattened: lvs. dark green, without white markings below:.....2. *C. nootkatensis*

Branchlets flattened: lvs. with glaucous or white markings below:.....3. *C. pisifera*

Lateral lvs. much larger than facial ones.

Lvs. obtuse, not glandular: staminate fls. yellow:.....4. *C. obtusa*

Lvs. acutish, with conspicuous gland on back: staminate fls. red:.....5. *C. Lawsoniana*

1. *C. thyoides*, Britt. (*C. sphaeroidea*, Spach. *Cupressus thyoides*, L.). WHITE-CEDAR. Tree to 80 ft., with reddish-brown bark and flattened slender spreading branchlets: lvs. closely imbricated or spreading at apex on leading shoots, acute, keeled, with conspicuous gland on back, glaucous or light green: cones  $\frac{1}{4}$  in. diam., bluish-purple with glaucous bloom. Swamps, Me. to Fla. and Miss.—Runs into variegated and glaucous forms.

2. *C. nootkatensis*, Sudw. (*Cupressus nootkatensis*, Lambert. *Thujopsis borealis*, Hort.). Tree to 120 ft., with brownish-gray bark and terete or slightly flattened pendulous branchlets: lvs. densely imbricate or spreading at apex on leading shoot, acute, mostly without glands, dark green: cones nearly  $\frac{1}{2}$  in. diam., dark red-brown with glaucous bloom. Alaska to Ore.; first described from specimens collected at Nootka Sound.—There are compact and pendulous forms and with glaucous and yellow foliage.

3. *C. pisifera*, Sieb. & Zucc. (*Cupressus pisifera*, Koch. *Retinispora pisifera*, Sieb. & Zucc.). SAWARA CYPRESS. Tree to 100 ft., with red-brown bark and flattened somewhat pendulous branchlets: lvs. slightly spreading, with mucronate tips, obscurely glandular, dark green and shining above and with glaucous or white lines below: cones  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., brown. Japan.—Runs into many vars., those most commonly cult. being: Var. *filifera*, Beissn. (*Retinispora filifera*, Standish), with slender, thread-like, gracefully pendulous branches; var. *plumosa*, Beissn. (*Retinispora plumosa*, Veitch), of dense conical habit, the almost erect branches with slender feathery branchlets, and light green foliage; var. *squarrosa*, Beissn. & Hochst. (*Retinispora squarrosa*, Sieb. & Zucc.), of densely branched habit, with spreading feathery branchlets and spreading lvs. glaucous above and silvery below.

4. *C. obtusa*, Sieb. & Zucc. (*Cupressus obtusa*, Koch. *Retinispora obtusa*, Sieb. & Zucc.). HINOKI CYPRESS. Tree to 120 ft., with reddish-brown bark and horizontal branches with flattened frond-like pendulous branchlets: lvs. closely appressed, the lateral much longer than the facial, not glandular, obtuse, bright shining green above with whitish lines beneath: cones nearly  $\frac{1}{2}$  in. diam., brown. Japan.—Runs into many vars. varying in color and habit, a few of which are: Var. *lycopodioides*, Carr., a low form with spreading rigid branches and thick nearly terete branchlets; var. *filicoides*, Beissn., with short densely frond-like branches; var. *ericoides*, Bochner (*Retinispora Sanderi*, Sander), a juvenile form of low subglobose habit with bluish-gray linear lvs.

5. *C. Lawsoniana*, Parl. (*Cupressus Lawsoniana*, Murr.). LAWSON CYPRESS. Tree to 200 ft., with reddish-brown bark and horizontally spreading usually pendulous branches with flattened frond-like branchlets: lvs. closely appressed, the lateral much longer than the facial lvs., acute or acutish, with conspicuous gland on back, bright green marked below with indistinct white streaks: staminate fls. bright red: cones about  $\frac{1}{2}$  in. diam., red-brown and often glaucous. (Named for Chas. Lawson, 1794–1873, English nurseryman.) S. W. Ore. to N. W. Calif.—There are numerous garden forms, of upright or columnar habit, spreading and pendulous, dwarf or compact growth, and with silvery, yellow or glaucous foliage.

17. CUPRESSUS, L. CYPRESS. Evergreen trees or rarely shrubs, of about 12 species in Pacific N. Amer. and Mex. and S. E. Eu. to China, planted in warm regions.—Bark usually separating into long shred-like scales; branchlets cylindrical or 4-winged, rarely compressed: lvs. small and scale-like, opposite, appressed, minutely denticulate, the juvenile lvs. needle-shaped and spreading: fls. minute, terminal, solitary, the sexes on separate branches; staminate fls. oblong, of 6–12 decussate stamens, yellow; pistillate fls. subglobose, the scales with numerous erect ovules: cones nearly globular, ripening the second year, with peltate scales and winged seeds. (Cupressus: classical name.)—Others of the native species may be transferred to grounds.



- Cones 1-1½ in. across.  
 Staminate fls. with 10-12 stamens: lvs.  $\frac{1}{8}$  in. long.....1. *C. sempervirens*  
 Staminate fls. with 6-8 stamens: lvs.  $\frac{1}{8}$  in. long.....2. *C. macrocarpa*  
 Cones  $\frac{1}{2}$ -1 in. across.  
 Branchlets distinctly flattened: cones  $\frac{1}{3}$ - $\frac{1}{2}$  in. across.....3. *C. funebris*  
 Branchlets cylindrical or only slightly flattened: cones  $\frac{1}{2}$ -1 in. across.  
 Lvs. conspicuously glandular on back.....4. *C. Macnabiana*  
 Lvs. not glandular on back.  
 Tips of lvs. acute: cones with glaucous bloom.....5. *C. lusitanica*  
 Tips of lvs. obtusish: cones without bloom.....6. *C. torulosa*

1. *C. sempervirens*, L. ITALIAN CYPRESS. Tree to 80 ft., with thin gray bark and erect or horizontal branches: lvs. scale-like, closely appressed, obtuse, glandular on back, dark green: staminate fls. with 10-12 stamens: cones 1 1½ in. across, with 8-14 scales with short boss on back. S. Eu., W. Asia.—There is a narrow columnar form and one with a broad pyramidal head.

2. *C. macrocarpa*, Hartw. (*C. Lambertiana*, Gord.). MONTEREY CYPRESS. Tree to 70 ft. high, with dark reddish-brown ridged bark and horizontal branches: lvs. closely appressed, swollen toward the tip, obtuse, not glandular, dark or bright green: staminate fls. with 6-8 stamens: cones 1 1½ in. across, with 8-12 scales with short obtuse boss on back. Bay of Monterey, Calif.—There are fastigate and yellow-leaved kinds. Var. *Crippsii*, Gord., is a juvenile form with spreading sharp-pointed lvs. and rigid short silvery-tipped branchlets.

3. *C. funebris*, Endl. MOURNING CYPRESS. Tree to 60 ft., with smooth brown bark and wide-spreading pendulous branches and flattened branchlets in the same plane: lvs. appressed or spreading at apex, acute, light green: cones  $\frac{1}{3}$ - $\frac{1}{2}$  in. across, with 8 scales with a short-pointed boss. China.

4. *C. Macnabiana*, Murr. Shrub or small tree to 20 ft. or more high, with thin dark reddish-brown bark and dense pyramidal head: lvs. obtuse, thickened at apex, conspicuously resinous-glandular on back, dark green or glaucous: cones  $\frac{3}{4}$ -1 in. across, dark red-brown, often glaucous, with usually 6 scales with prominent conical and curved bosses on back. (Bears the name of James McNab, 1810-1878, English gardener.) Calif., S. Ore.—There is a kind with golden-tipped branchlets.

5. *C. lusitanica*, Mill. PORTUGUESE CYPRESS. Tree to 50 ft., with reddish-brown bark and irregularly ramified, slightly compressed, pendulous branchlets: lvs. appressed, slightly free at tips, acute, glaucous: cones about  $\frac{1}{2}$  in. across, covered with glaucous bloom, with 6-8 scales with elongated, pointed and usually hooked boss. Mex. Var. *Benthami*, Carr., has the branchlets pinnately and regularly ramified in one plane. (Named for Geo. Bentham, 1800-1884, English botanist.) Var. *Knightiana*, Rehd. (*C. Knightiana*, Knight & Perry), is more regularly branched and has glaucous foliage.

6. *C. torulosa*, Dougl. BHUTAN CYPRESS. Pyramidal tree to 150 ft., with brown bark, short horizontal branches ramified in one plane and slender drooping branchlets: lvs. appressed or slightly spreading at apex, obtusish, bright or bluish-green: cones  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, with 8-10 scales with short obtuse inconspicuous boss. Himalayas.

18. **THUJOPSIS**, Sieb. & Zucc. One evergreen tree of dense broad pyramidal habit, native in Cent. Japan.—Branchlets much broadened and frond-like, arranged in horizontal planes: lvs. opposite in pairs: staminate fls. with 6-10 decussate pairs of stamens: cones subglobose, with 6-10 woody, flattened, imbricated scales, bearing 3-5 winged seeds. (*Thujoopsis*: like *Thuja*.)

**T. dolobrata**, Sieb. & Zucc. (*Thuja dolobrata*, L. f.). HIBA ARBOR-VITÆ. Tree to 50 ft. high, with branchlets to  $\frac{1}{4}$  in. broad: lvs. green and glossy above with broad white band below, the lateral ones spreading, ovate-lanceolate and curved, the upper and under ones appressed, obovate-oblong: cones  $\frac{1}{2}$ - $\frac{3}{8}$  in. long, the scales with prominent often curved umbo below apex.—There are variegated and dwarf forms.

19. **LIBOCEDRUS**, Endl. INCENSE-CEDAR. Eight species of evergreen resinous trees native in W. N. Amer., S. Amer., New Zeal., New Caledonia, New Guinea, Formosa, and S. W. China.—Bark scaly; branches erect or spreading, with flattened frond-like branchlets: lvs. opposite in pairs, scale-like, with decurrent bases: fls. solitary, terminal, the sexes on different

branchlets; staminate with 12–16 decussate stamens: cones oblong to ovate, with 4 or rarely 6 woody scales, one pair bearing 2 long-winged seeds. (*Libocedrus*: Greek *tear*, and *Cedrus*, alluding to their resinous character.)

- Lvs. green on both sides.....1. *L. decurrens*  
Lvs. with white band beneath.....2. *L. chilensis*

1. *L. decurrens*, Torr. (*Thuja gigantea*, Carr.). Tree to 100 to 200 ft. high, with bright cinnamon-red bark, erect spreading branches and much flattened branchlets: lvs. with long decurrent base, adnate to the branchlets except at the acuminate tips, dark lustrous green on both sides, glandular on back: cones light reddish-brown,  $\frac{3}{4}$  1 in. long, with 3 pairs of scales, the upper connate. Ore. to Nev. and Lower Calif.

2. *L. chilensis*, Endl. Tree to 60 ft. high: lvs. in 4 ranks, the lateral pair much larger, boat-shaped, keeled, acute and spreading at apex, with white band beneath: cones  $\frac{1}{2}$  in. long, with 2 pairs of scales. Chile.

20. **THUJA**, L. ARBOR-VITÆ. Aromatic resinous evergreen trees of 6 species in N. Amer. and E. Asia.—Bark thin and scaly; branchlets flattened, frond-like: lvs. scale-like, opposite in pairs, appressed, usually glandular on back, the juvenile lvs. needle-shaped: fls. minute, solitary, terminal, the two sexes commonly on different branchlets; staminate fls. yellow, of 6–12 decussate stamens; pistillate fls. with 8–12 scales in opposite pairs, with 2 ovules at base inside: cones ovoid-oblong, erect, the scales with thickened ridge or umbo at apex; seeds thin and winged or thick and wingless. (Thu-ja: classical name.)

Branchlets in vertical planes: cone-scales thick; seeds wingless.....1. *T. orientalis*  
Branchlets in horizontal planes: cone-scales thin; seeds winged.

Lvs. yellowish-green beneath, with conspicuous gland on back.....2. *T. occidentalis*  
Lvs. with triangular white markings beneath, not or inconspicuously glandular.

Apex of lvs. acute: fertile cone-scales usually 6.....3. *T. plicata*  
Apex of lvs. obtuse: fertile cone-scales usually 4.....4. *T. Standishii*

1. *T. orientalis*, L. (*Biota orientalis*, Endl.). ORIENTAL ARBOR-VITÆ. Shrub or small tree to 25 ft., with thin reddish-brown bark and spreading and ascending branches: lvs. of main axes with free spreading apex, of lateral branchlets closely appressed, acute, bright green, with small gland on back: cones  $\frac{1}{2}$  1 in. long, with usually 6 woody scales, the upper pair sterile; seeds thick and wingless. N. China, Korea.—There are many garden vars. distinguished by habit and color.

2. *T. occidentalis*, L. AMERICAN ARBOR-VITÆ. Tree to 60 ft. high, with light red-brown bark and horizontal branches ascending at end: lvs. acute or apiculate, usually conspicuously glandular, bright green above and yellowish-green beneath: cones about  $\frac{1}{2}$  in. long, brownish-yellow, with 8–10 scales, 4 of which are fertile; seeds winged. N. S. to N. C. west to Ill.—Runs into numerous cult. vars.: those distinguished by color, as var. *Vervaeneana*, Henk. & Hochst., with yellowish foliage, and var. *Douglasii aurea*, Hort., with bronzy-yellow lvs.; of pyramidal or fastigiate habit, as vars. *robusta*, Carr. (var. *Wareana*, Beissn.), *Riversi*, Beissn., *Rosenthalii*, Ohlend., *Douglasii pyramidalis*, Spaeth.; dwarf or globose forms as vars. *Hoveyi*, Veitch, *Woodwardii*, Hort.; juvenile forms as var. *Ellwangeriana*, Beissn. (var. *Tom Thumb*), and var. *ericoides*, Beissn. & Hochst. (*Retinispora ericoides*, Hort.); of irregular or abnormal habit, as var. *Ohlendorfi*, Beissn. (var. *Spaethii*, P. Smith) and var. *spiralis*, Hort.

3. *T. plicata*, D. Don (*T. gigantea*, Nutt.). GIANT ARBOR-VITÆ. Tree to 200 ft., with cinnamon-red bark, trunk much buttressed at base, and horizontal branches often pendulous at ends: lvs. of vigorous shoots widely spaced, ending in long points parallel to axis, of lateral branchlets acute and scarcely glandular, glossy bright green above with whitish triangular spots beneath: cones about  $\frac{1}{2}$  in. long, with 8–10 scales of which 6 are usually fertile; seeds winged. Alaska to N. Calif. and Mont.—There are columnar and pendulous forms.

4. *T. Standishii*, Carr. (*T. japonica*, Maxim. *Thujopsis Standishii*, Gord.). Tree to 50 ft., with reddish-brown bark and spreading or ascending branches with rather thick compressed branchlets: lvs. of the main axes with rigid free points, of the lateral branchlets obtuse, bright green above with triangular white marks below, glandless: cones  $\frac{1}{3}$   $\frac{1}{2}$  in. long, with 10–12 scales of which 4 are fertile; seeds winged. Japan; introduced by Fortune to the nursery of Mr. Standish in England, about 1861.

## 11. PANDANACEÆ. SCREW-PINE FAMILY

Three genera and about 400 species comprise the Screw-pine Family, so called because of the spiral masses of pineapple-like lvs. on the summits of the branches; they are natives in tropics of the Old World, mostly in Malaya and the Pacific Isls.—More or less arboreous, sometimes climbing, mostly producing stilt-like roots above ground: lvs. long, stiff and sword-like (sometimes almost grass-like), often spine-margined: stamens and pistils separate, scattered over the floral axis and not in definite fls. (parts diœcious by abortion), in axillary or terminal heads and spikes (panicles in one non-hort. genus), the leafy spadix-bracts mostly conspicuous or colored, caducous; fertile parts usually closely aggregated; perianth mostly wanting; stamens few to many, with free or connate filaments, rarely represented in fertile fls. by staminodes; ovary 1- to many-celled, with ovules solitary or several: fr. a syncarpium or aggregate, formed of the union or the close crowding of the carpels, ball-like or cone-like, often large and heavy.

**PANDANUS**, L. SCREW-PINE. Species probably 250; a very few are cult. for ornament after the manner of palms; they rarely fruit except in warm and trop. countries.—Shrubs or trees, the trunk sometimes prostrate but usually stiffly erect, simple or forked, with long persistent hard lvs.: fls. naked; stamens numerous on the spike; pistils densely crowded in a head or oblong spike: fr. a hard composite mass, with many detachable parts angled and straight-sided by pressure, the top conical or shouldered and more or less 6-angled. (*Panda-nus*: Latinized from a Malayan name.)—Cult. forms are likely to be sterile and the botanical position therefore undeterminable.

- |  |                      |
|--|----------------------|
| Lvs. very narrow and slender, $\frac{1}{2}$ in. or less broad..... | 1. <i>P. pygmæus</i> |
| Lvs. broad, 2 in. or more.   |                      |
| Lf. margined white.....  | 2. <i>P. Veitchi</i> |
| Lf. with several yellow lengthwise bands.....                      | 3. <i>P. Sanderi</i> |
| Lf. green throughout.....  | 4. <i>P. utilis</i>  |

1. *P. pygmæus*, Thouars. Small plant, the trunk reaching only 1-2 ft.: lvs. very narrow, 1-2 ft. long and about  $\frac{1}{8}$  in. broad, very long slender pointed, with small very sharp ascending spines on margin and rib beneath: fertile infl. terminal, short and surrounded by the foliage. Madagascar; this is apparently the name of the plant grown as *P. graminifolius*.

2. *P. Veitchi*, Dall. Much grown as a pot plant: lvs. 2-3 ft. and more long, long-pointed, spine-margined throughout, 2-3 in. broad when grown (narrower in young specimens), somewhat recurved, with bands of silvery-white on or near the margins. Polynesia; botanical position yet in doubt; introduced in 1868 by Messrs. Veitch, nurserymen of London.

3. *P. Sanderi*, Mast. Of denser more tufted habit than No. 2: lvs. with golden-yellow bands from midrib to margin. Timor, E. Indies; botanical position in doubt; exhibited as a novelty in 1898 at Ghent by Messrs. Sander.

4. *P. utilis*, Bory. Stout branching tree to 50 and 60 ft. and more, making many brace-roots: lvs. glaucous, erect, 1-3 ft. long, 3 in. broad, with many very sharp ascending reddish spines on margins and rib beneath: syncarp solitary, pendulous, long-peduncled, 6-8 in. diam., comprising about 100 fibrous carpels 3-8-celled and upward of 1 in. long with the lower part prism-shaped and the upper part convex-pyramidal, each one containing a hard several-seeded nut. Madagascar; widely cult. for ornament, and lvs. also used for making baskets and domestic articles.

## 12. APONOGETONACEÆ. APONOGETON FAMILY

Aquatic perennial herbs with tuberous rhizomes and floating or submerged lvs., grown in ponds and aquaria, of a single genus.

**APONOGETON**, L. f. About 25 species, native in Afr., trop. Asia, and Australia.—Lvs. long-petioled, rarely sessile, oblong or linear-lanceolate, with

many parallel and transverse veins, sometimes the tissue wanting between: infl. spicate, in 1-2 or rarely 3-4 spikes; fls. bisexual or plant rarely dioecious; perianth-parts usually 2, rarely 1 or 3, obovate or oblong, colored, persistent or deciduous; stamens 6 in 2 whorls, rarely more in 3-4 whorls, hypogynous; ovary sessile, comprised usually of 3 free 1-celled carpels, ovules 2-8. (Aponogeton: Greek, referring to the habitat in the water.)

- Lvs. solid, with no openwork ..... 1. *A. distachyus*  
 Lvs. skeletonized, lattice-like ..... 2. *A. fenestralis*

1. *A. distachyus*, L. f. CAPE POND-WEED. WATER-HAWTHORN. Smooth, glabrous: lf.-blades floating, long-petioled, linear-oblong, base obtuse or slightly rounded; infl. 2-spiked; bracts usually 1 but in terminal fls. commonly 2, white, conspicuous, very fragrant; anthers purplish. Cape of Good Hope.—A var. with violet bracts and lvs. violet beneath, var. *Lagrangei*, André, is sometimes cult.

2. *A. fenestralis*, Hook. f. (*Ouvirandra fenestralis*, Poir.). LACE-LEAF. LATTICE-LEAF. Lvs. submerged, reduced to a network of veins; several strong veins parallel with midrib, with numerous cross-veins; blade broad-oblong, apex truncate or retuse but with a minute point at the middle, green: infl. usually 2-spiked, borne on a peduncle a ft. or more long; perianth-parts 2, white. Madagascar; known in aquaria for its foliage.

### 13. ALISMACEÆ. WATER-PLANTAIN FAMILY

Marsh or aquatic perennial herbs, of about 12 genera and 50 species, distributed over the warm and temp. zones, little planted.—Lvs. mostly basal, sheathing, very variable: monœcious or rarely dioecious: fls. borne in bracted whorls, pedunculate, on scapose sts., bisexual; perianth of 3 persistent sepals and 3 white deciduous petals; stamens 6 or more, rarely 3, hypogynous or essentially so; ovaries 6 or more, rarely 3, 1-celled, 1- rarely 2- or more-ovuled, becoming indehiscent achenes in fr.

**SAGITTARIA**, L. ARROWHEAD. About 30 species, a few of which are grown in ponds and aquaria.—Stoloniferous, with milky juice: lvs. erect, rarely floating or submerged, sagittate, lanceolate, ovate or hastate: fls. pedicelled, borne in whorls of 3, racemose or paniculate; ovaries numerous. (Sagittaria: from Latin *sagitta*, arrow, referring to the shape of the lvs.)—Some species produce edible tubers.

- Sepals enlarged after flowering ..... 1. *S. montevidensis*  
 Sepals withering after flowering ..... 2. *S. sagittifolia*

1. *S. montevidensis*, Cham. & Schlecht. GIANT ARROWHEAD. Growing very large, up to 6 ft. and more, glabrous, smooth: petals white with brownish-purple blotch at base; sepals erect and enlarged after flowering: achenes appressed. Brazil to Argentina, Peru; run wild in Calif., Ala., and N. C.

2. *S. sagittifolia*, L. OLD-WORLD ARROWHEAD. From 3-4 ft. tall, glabrous, smooth: sepals withering after flowering, spreading or reflexed; petals clawed, white, base purple spotted: beak of achene short, erect. Widely distributed through Eu. and Asia.—Var. *flore-pleno*, Hort. (*S. japonica*, Hort.), has double fls. The native *S. latifolia*, Willd., may occasionally be transferred from the wild; it differs from *S. sagittifolia* in the beak being almost four times the length of the body of the achene.

### 14. BUTOMACEÆ. BUTOMUS FAMILY

Marsh or aquatic perennial herbs, of 4 genera and about 10 species, in temp. and trop. regions of Old World and trop. Amer.—Closely allied to the Alismaceæ, but differs in having numerous ovules and frs. dehiscent on the ventral suture: fls. solitary or in umbels, bisexual, conspicuous.

- Plants not having milky juice: embryo straight ..... 1. **BUTOMUS**  
 Plants with milky juice: embryo shoe-shaped ..... 2. **LIMNOCHARIS**  
 Carpels numerous; stigma sessile ..... 3. **HYDROCLEIS**  
 Carpels 3-6; stigma borne on end of long style



1. **BUTOMUS**, L. **FLOWERING-RUSH**. One species distributed in Eu., Asia, N. India.—Lvs. long-linear, 3-cornered, becoming acuminate: perianth-segms. 6, all colored, persistent; stamens 9, all fertile; carpels 6; seeds numerous, small; embryo straight. (Bu-tomus: from Greek for *ox* and *cut*, referring to the sharp lvs. which cut the mouths of cattle.)

**B. umbellatus**, L., grown along the edges of ponds, has lvs. 2-3 ft. long, iris-like, and rose-colored fls. borne on a bracted umbel on a long scape.

2. **LIMNOCHARIS**, Humb. & Bonpl. Two species in trop. Amer.—Lvs. emersed, lanceolate or ovate, petiolate: fls. bisexual; sepals 3, persistent; petals 3, fugacious, thin; stamens numerous, outer ones sterile; carpels 15-20; style lacking, stigma sessile, extrorse. (Limnoch-aris: Greek, referring to the marsh habitat.)

**L. flava**, Buchenau (*L. Plumieri*, Rich. *L. emarginata*, Humb. & Bonpl.). Erect-growing, standing 1-2 ft. or more out of water: lvs. large, blunt, velvety green: fls. 2-12 in an umbel, scapose; sepals green; petals yellow. W. Indies, Peru to Cent. Brazil.

3. **HYDROCLEIS**, Rich. Three species in Brazil, one grown in ponds and aquaria.—Fls. bisexual, with 3 persistent sepals and 3 fugacious petals; stamens many, outer sterile; carpels 3 or 6, rarely 4 or 8, connate at base, gradually attenuate into the style. (Hydroc-leis: Greek for *water* and *key*.)

**H. nymphoides**, Buchenau (*Limnocharis Humboldtii*, Rich.). **WATER-POPPY**. Sts. prostrate, rooting at the nodes: lvs. mostly floating, broad-ovate, cordate at base, long-petioled, glabrous above, sparsely hairy beneath: lvs. and fls. arising from bracted nodes: fls. about 2 in. across, yellow; fertile stamens violet or purple; carpels usually 6. Spread in trop. S. Amer. to Buenos Aires.

## 15. HYDROCHARITACEÆ. FROGS-BIT FAMILY

Aquatic herbs submerged or rarely floating, of 14 genera and about 40 species widely distributed over the world, little known horticulturally.—Lvs. various, crowded at base of st., sessile, linear to lanceolate, or fascicled, petiolate, expanded and floating: fls. regular, unisexual or rarely bisexual, arising from a bracted spathe; perianth in 2 series, the 3 outer parts calyx-like, 3 inner petaloid; stamens 3-12, distinct or monadelphous; ovary inferior, 1-celled with 3 parietal placentæ, or rarely 3-celled with axillary placentæ.

**HYDROCHARIS**, L. Two species, one of which is grown in aquaria.—Lvs. long-stalked, roundish, with heart-shaped base: sts. having thin runners which form winter-buds in the fall: petals white; styles 6, 2-parted. (Hydroch-aris: Greek for *water* and *grace*.)

**H. Morsus-ranæ**, L. **FROGS-BIT**. A delicate floating plant, with thick glabrous lvs. 2 in. across, and fine silky roots: peduncles of staminate plant bearing 2-4 fls. on long pedicels. (Morsus-ranæ: Latin *morsus*, bite, and *rana*, frog.) Eu. and E. Asia.

## 16. GRAMINEÆ. GRASS FAMILY

One of the most important to man of the families of plants, the product comprising human foods in rice, wheat, oats, barley, rye, maize, bamboo, sugar-cane, and others; forage and fodder for live-stock; materials used in construction and the arts, as the bamboos; sand-binding plants; many species grown for ornament; and they contribute much to the landscape of the earth. The recognized genera are about 400 and the species now known about 4,500, represented in all parts of the world. The grasses are probably the most cosmopolitan of the higher plants. The animal husbandry of the world, as now developed, could not subsist without the grazing grasses and the cereal grains.



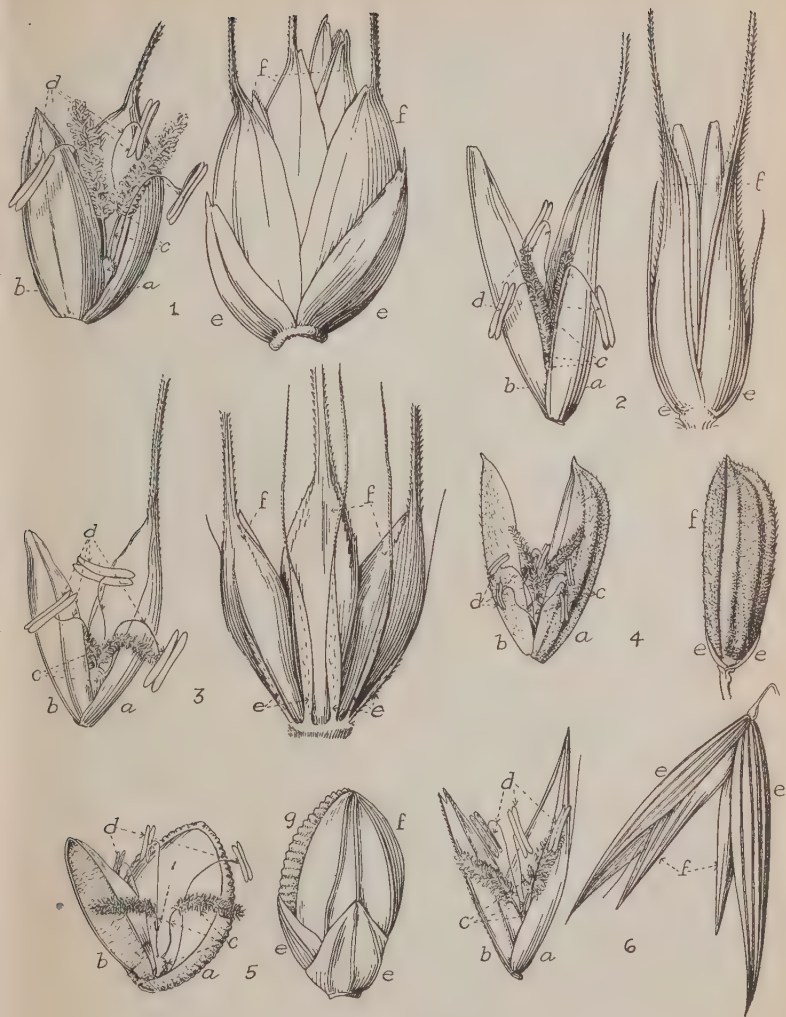


FIG. 6. FLORETS AND SPIKELETS OF GRASSES.

*a* (in each case), lemma of a displayed floret; *b*, palea; *c*, pistil, showing ovary, styles and stigmas; *d*, stamens, showing filaments and anthers; *e*, glumes; *f*, florets; *g*, sterile floret.—  
 1. Wheat, floret and spikelet. 2. Rye, floret and spikelet. 3. Barley, floret and cluster of three spikelets. 4. Rice, floret and spikelet. 5. Pigeon grass (*Setaria*), floret and spikelet. 6. Oats, floret and spikelet.

## GRAMINEÆ

The fls. are highly specialized and minute, but they are not difficult to understand by careful study. The species are annual and perennial herbs, and the bamboos are mostly woody and some of them are climbers. Grasses of one kind or another grow in all kinds of soils and situations.—Fls. known as *florets* (fl.), 1 or more of them borne in a *spikelet*; the spikelets are variously assembled into spikes, heads, or panicles. The spikelet normally has 2 empty scales at its base, known as *glumes*. The floret itself is borne on the rachis or *rachilla* of the spikelet, and is comprised of (1) the essential organs, (2) an outside scale or *lemma* in the axil of which the other parts are borne, (3) a *palet* (or *palea*) next the rachilla and with its back toward it, and (4) usually 2 very small scales or *lodicules* at the base and inside the lemma, and sometimes a third lodicule inside the palet. Except the lodicules (which are seldom cited in untechnical descriptions), the parts are displayed in Fig. 6, showing six grasses; the spikelet is at the right in all cases; *f* designates the florets, *e* the glumes, *a* the lemmas, *b* the palets, *d* the stamens, *c* the pistil. The fls. are perfect or imperfect (plant monœcious or diœcious); stamens commonly 3, but sometimes 1, 2, or 6, with 2-celled anthers; pistil 1, with usually 2 plumose stigmas: fr. a ripened pistil, mostly forming a hard grain known as a *caryopsis*, which (as in oats and rye) is often permanently enveloped in the indurated lemma and palet: culms (sts.) jointed, mostly hollow, tall and slender or sometimes prostrate: lvs. 2-ranked (third over the first), at the base sheathing the culm, the sheath usually open on the side opposite the blade and provided at the junction with the blade with a hyaline or hairy projection known as a *ligule*.

Other grasses than those here described are likely to be in cult. for special purposes, and some of the other native species are used and more or less sown for forage. The two following may be mentioned:

**AXONOPUS compressus**, Beauv. (*Anastrophus compressus*, Schlecht.), CARPET-GRASS, from Va. to the tropics, is a stoloniferous perennial, much utilized for pasture in the southern states: culms ascending, a few inches to 2 ft., flattened: lvs. rather short, flat, with abrupt apex: spikes in pairs or digitate, 1-4 in. long, slender: genus allied to *Panicum*.

**ZOYSIA** (*Osterdamia*) **Matrella**, Merr. (*Z. pungens*, Willd.), MANILA-GRASS, is a creeping low perennial with very fine lvs., used somewhat for lawns in the southern states and Calif., as are the following: *Z. japonica*, Steud., KOREAN LAWN-GRASS, is a coarser plant with lvs. about  $\frac{1}{2}$  in. broad; *Z. tenuifolia*, Willd., MASCARENE-GRASS, is finer in foliage than the others, forming an excellent turf.

A1. Grasses of the bamboo kind: evergreen plants with long stout woody perennial culms or canes, not branching or forking near the base: lf.-blades mostly relatively short and broad, flat for the most part, usually jointed to the sheath and sometimes petioled: fls. (seldom produced in cult. in the U. S.) mostly in 2-8-flid. spikelets which are panicle, racemed, or in clusters at the nodes; glumes 2; lower lemmas often empty; stamens 3 or 6; styles 2 or 3: fr. a thin-walled caryopsis, nut or berry. Many bamboos have been introduced in the warmer parts of the U. S., and into greenhouses, some of them capable of standing in the open as far north as Philadelphia, but the botanical identity of many of the hort. kinds is yet to be determined. Without the fls. and frs. many of the planted bamboos cannot be placed in the proper genus; the plants may bear label names in one or another genus. The bamboos constitute a well-marked botanical group.

- B. Culm very large and tall, solid (at least in dry climates): plant mostly of great size (in ours), not spiny: fr. a small nut or berry, the seed free. .... 1. DENDROCALAMUS
- BB. Culm large or slender, usually hollow: plant mostly relatively small or medium, sometimes bearing spines: fr. thin-walled, the seed adnate to the wall.
  - c. Lf.-sheaths early deciduous: culm usually flattened on one side, at least in the internodes above the base of the plant. .... 2. PHYLLOSTACHYS
  - cc. Lf.-sheaths persistent: culm terete.
    - d. Stamens 6: 3 or 4 lower glumes (lemmas) empty. .... 3. BAMBUSA
    - dd. Stamens 3: 1 or 2 lower glumes empty. .... 4. ARUNDINARIA

# GRAMINEÆ

A2. Grasses of the cereal-grain and annual-forage kind: rice, wheat, emmer, spelt, barley, rye, oats, maize, sorghum, milo, kafir, millets: plants not closely allied botanically, but a marked cultural group, annuals grown regularly in fields and harvested for the grain, straw and stalks.

- B. The corn crops (maize, kafir) and their kin: flts. staminate or pistillate, or in the kafir tribe perfect and staminate.
- c. Plants monœcious, the staminate and pistillate flts. in different spikelets or even in different inflorescences: the cult. cereal kinds are coarse erect annuals (Maydeæ).
- D. Staminate flts. in a terminal panicle or tassel; pistillate in axillary sheathed spikes or ears.
- E. Ears small, clustered at the nodes, breaking at maturity into little pieces..... 5. EUCHLÆNA
- EE. Ears large and separate, remaining intact..... 6. ZEA
- DD. Staminate flts. terminating the infl., the pistillate at the base and inclosed in a bead-like body..... 7. COIX
- CC. Plants not monœcious, although some of the flts. are sterile: 3 spikelets together or sometimes only 2, the central lower one with a perfect and fertile flt. and the two lateral and upper ones staminate: sorghum, kafir, etc..... 8. HOLCUS
- BB. The small grains and their kin: spikelets with imperfect flts. at bottom or top.
- c. Imperfect flts. (if any) at base of spikelet.
- D. Spikelets essentially terete or cylindrical: millets.
- E. Prominent bristles accompanying or subtending the spikelets.
- F. Bristles falling at maturity with the spikelets..... 19. PENNISETUM
- FF. Bristles persisting on the rachis after the spikelets fall .... 20. SETARIA
- EE. Prominent bristles not subtending the spikelets.
- F. Awn or sharp point present on the sterile lemma..... 16. ECHINOCHLOA
- FF. Awn wanting on the lemmas..... 15. PANICUM
- DD. Spikelets much flattened laterally: rice..... 21. ORYZA
- CC. Imperfect flts. above the fertile ones in the spikelet, except in No. 30.
- D. Lower flt. in the spikelet perfect: oats..... 29. AVENA
- DD. Lower flt. staminate..... 30. ARRHENATHERUM
- E. Infl. spicate, terminating the culm: Hordeæ.
- F. Each node of rachis bearing 1 spikelet.
- G. Glumes 3-nerved, broad: wheat, spelt..... 36. TRITICUM
- GG. Glumes 1-nerved, very narrow: rye..... 37. SECALE
- FF. Each node bearing 3 spikelets: barley..... 38. HORDEUM
- EE. Infl. digitate or umbellate—radiating spikes at top of culm. 34. ELEUSINE

A3. Grasses of the sugar-producing kind: sugar-cane, strong perennial upstanding grass grown far S. (Sirup is also made from certain vars. of sorghum, which are sometimes improperly called "sugar-cane").... 8. HOLCUS  
9. SACCHARUM

A4. Grasses of the sod-forming kind, used in pastures and meadows and the making of lawns. These are the "agricultural grasses," small perennials for the most part, of many botanical affinities, comprising such kinds as reedtop, rye-grass, june-grass, orchard-grass, bermuda-grass, timothy, fescue.

- B. Infl. digitate or umbellate—consisting of a few slender branches radiating from the top of the culm.
- c. Spikelets with 1 perfect flt. and no imperfect ones..... 35. CYNODON
- CC. Spikelets with 1 perfect flt. and others imperfect..... 33. CHLORIS
- CCC. Spikelets several-fld..... 34. ELEUSINE
- BB. Infl. spicate—a single spike or spike-like cluster with no long-stalked branches.
- c. Rachis of spike thickened and spikelets sunk therein..... 14. STENOTAPHRUM
- CC. Rachis slender: spikelets not sunken.
- D. Spikelets all alike.
- E. First glume wanting; spikelets sessile on opposite sides of rachis, edgewise to it..... 39. LOLIUM
- EE. First glume present; spikelets short-pedicel in spike-like panicles.
- F. Plants strong-scented: panicle not dense..... 22. ANTHOXANTHUM
- FF. Plants not scented: panicle dense.
- G. Glumes falling with the spikelet, the pedicel articulated..... 25. ALOPECURUS
- GG. Glumes persistent, no articulation..... 26. PHLEUM
- DD. Spikelets of 2 kinds, perfect and sterile, in pairs, in dense 1-sided panicle..... 50. CYNOSURUS
- BBB. Infl. markedly paniculate or open, branching.
- c. Perfect flt. 1 in the spikelet, and no sterile lemmas..... 24. AGROSTIS

# GRAMINEÆ

- cc. Perfect fts. 2 or more in the spikelet.  
 d. Awn from the back of the lemma.....30. *ARRHENATHERUM*  
 dd. Awn wanting, or arising from the tip of the lemma.  
 e. Spikelets borne in 1-sided glomerules, these arranged in a panicle that contracts in fr.....48. *DACTYLIS*  
 ee. Spikelets otherwise.  
 f. Lemmas bifid at tip.....43. *BROMUS*  
 ff. Lemmas entire, acute or awned.....40. *FESTUCA*  
 fff. Lemmas entire, obtuse or essentially so, usually cobwebby at base.....41. *POA*
- A5. Grasses of the ornamental kind, a division well known to cultivators but not constituting a botanical class or group: some of them are small annual grasses grown for pot and table ornament, specially for dry bouquets; others are stout perennial grasses planted in borders and lawns, as the eulalias and zebra-grasses, arundo, pampas-grass.
- b. Plant monœcious, or diœcious in No. 51.  
 c. Staminate infl. terminal on the culm, the pistillate in separate ears... 6. *ZEA*  
 cc. Staminate infl. terminating a cluster that is pistillate at base..... 7. *COIX*
- bb. Plant not monœcious, some or all the fts. being perfect (diœcious in No. 51).  
 c. Bearing spikelets with 1 perfect terminal ft., the lower fts., if any, neutral or staminate.  
 d. Lemma and palet very thin and hyaline, usually translucent: glumes firm.  
 e. Spikelets all alike, perfect.  
 f. Axis of raceme separating into parts or joints.....10. *ERIANTHUS*  
 ff. Axis continuous in raceme.....11. *MISCANTHUS*  
 ee. Spikelets not all alike.  
 f. Racemes whorled in a long panicle.....12. *ANATHERUM*  
 ff. Racemes in pairs from a sheathing bract, panicle.....13. *CYMBOPOGON*
- dd. Lemma and palet not hyaline or translucent, thick or hardened.  
 e. Bristles subtending spikelet.....19. *PENNISSETUM*  
 ee. Bristles not subtending spikelet.  
 f. Glumes and lemmas awnless.  
 g. First glume minute.....15. *PANICUM*  
 gg. First and second glumes about equal.....23. *PHALARIS*  
 ff. Glumes and lemmas awned.  
 g. Infl. paniculate.....18. *TRICHOLÆNA*  
 gg. Infl. a single axis with small secund racemes.....17. *OPLISMENUS*
- cc. Bearing spikelets with 1 to several or many fts., the upper fts., if any, neutral or staminate.  
 d. Infl. spicate—the spikelets in spikes or spike-like heads.  
 e. Spike secund or 1-sided.....33. *CHLORIS*  
 ee. Spike not 1-sided, short and woolly.....27. *LAGURUS*  
 eee. Spike not 1-sided or woolly, long.  
 f. Shape of spike cylindrical.....26. *PHLEUM*  
 ff. Shape flattened or rowed.  
 g. Spikelet 1 at each node of rachis.....39. *LOLIUM*  
 gg. Spikelets 2 or more at each node.....38. *HORDEUM*
- dd. Infl. paniculate or racemose.  
 e. Spikelet bearing 1 perfect ft.  
 f. Perfect ft. with 2 sterile lemmas beneath.....22. *ANTHOXANTHUM*  
 ff. Perfect ft. without sterile lemmas.  
 g. Awns long and stout, bent or twisted.....28. *STIPA*  
 gg. Awns none, or short and straight or weak.....24. *AGROSTIS*
- ee. Spikelet bearing 2 or more perfect fts.  
 f. Lemmas awned from the back or from between the teeth.  
 g. Plant velvety.....31. *NOTHOLCUS*  
 gg. Plant not velvety.  
 h. Spikelets small and delicate, 2-fld.....32. *ASPRIS*  
 hh. Spikelets large, 2-6-fld.....29. *AVENA*  
 ff. Lemmas awnless, or awned from the entire tip.  
 g. Plants of great size, reed-like, growing in clumps.  
 h. A diœcious species: lf.-blades  $\frac{3}{4}$  in. or less broad.....51. *CORTADERIA*  
 hh. A perfect-fld. species, but often not blooming in cult.: blades  $1\frac{1}{4}$  in. or more.....52. *ARUNDO*
- gg. Plants of small size, like ordinary grasses.  
 h. Fertile spikelets 1-fld. and long-awned: sterile spikelets with obtuse glumes.....49. *LAMARCKIA*  
 hh. Fertile spikelets not different.  
 i. Spikelets much flattened, sessile on a common rachis.....47. *DEMAZERIA*  
 ii. Spikelets little or not flattened, not sessile on a single rachis.  
 j. Lemmas thick, coriaceous, smooth and shining, margin not scarious.....45. *UNIOLA*  
 jj. Lemmas thin, membranaceous, or if thickish then the margin not scarious.  
 k. Nerves of lemmas 3.

- L. Spikelets nearly terete, in a narrow elongated panicle, bluish.....46. *MOLINIA*  
 LL. Spikelets somewhat flattened, in open or short panicle, mostly green.....42. *ERAGROSTIS*  
 KK. Nerves of lemmas 5 or more.  
 L. Spikelets in 1-sided heads or fascicles.....48. *DACTYLIS*  
 LL. Spikelets not secund.  
 M. Breadth of spikelet about as great as length.....44. *BRIZA*  
 MM. Breadth much less than length.  
 N. Lemmas obtuse or nearly so, usually cobwebby at base.....41. *POA*  
 NN. Lemmas acute or awned, not cobwebby.  
 O. Tip of lemma bifid.....43. *BROMUS*  
 OO. Tip of lemma entire.....40. *FESTUCA*

1. **DENDROCALAMUS**, Nees. A dozen to a score of species in S. Asia and Malaya, shrubby or tree-like, one of which is sometimes planted far S. and in the American tropics.—Flts. mostly bisexual, in globular clusters in long panicles; spikelets 2- to many-fld., 2 to many of the lower glumes empty; stamens 6: fr. small with thick hard wall and free seed. (*Dendrocalamus*: Greek *tree-reed*.)

*D. strictus*, Nees. MALE BAMBOO. Making great clumps, 40-50 ft. tall: culms 1-3 in. diam., nearly or quite solid (said to be hollow in moist climates), glaucous-green when young but becoming yellowish; branches long and slender: lvs. 1 ft. or less long, about 1 in. wide, with prominent midrib and strong nerves on either side: panicle large, with dense heads 1-1½ in. diam., the spikelets usually hairy. India, Java.

2. **PHYLLOSTACHYS**, Sieb. & Zucc. Probably 25 known species, in farther Asia, several of which are useful hort. plants in this country.—Flts. bisexual, in 1-4-fld. spikelets mostly on fascicled branchlets, the rachilla articulate and breaking between the florets; lower 2 or 3 glumes empty; palet narrow, 2-keeled, lightly many-nerved; stamens 3; styles 3: lvs. mostly short and distinctly petioled, the venation mostly tessellate, the sheaths deciduous leaving the old culm bare: culms woody, the inner faces of the internodes above the base of the plant, flattened. (*Phyllostachys*: Greek *leaf-spike*.)

- Culms and sts. green, yellow, or yellowish.  
 Plant dwarf, 3 ft. or less.....1. *P. Kumasaca*  
 Plant 5 ft. or more at maturity.  
 Internodes at base of culm very short.....2. *P. aurea*  
 Internodes at base well developed, not shortened.  
 Sts. conspicuously zigzag.....3. *P. viridi-glaucescens*  
 Sts. little if at all zigzag.....4. *P. mitis*  
 Culms and sts. becoming black.....5. *P. nigra*

1. *P. Kumasaca*, Munro (*P. ruscifolia*, Hort. *Bambusa ruscifolia*, Sieb.). Very dwarf, 1-3 ft., culm nearly solid, zigzag, green; sheaths purple, fringed; branches in 3's and 4's, 1-2 in. long, the foliage therefore all borne close to the main culm: lvs. 2-3 in. long, ¾-1 in. wide, narrowing into acute ends, tessellate or minutely cross-veined. (*Kumasaca*, the Japanese name, *Kumazasa*, for certain bamboos.) Japan.

2. *P. aurea*, Riv. (*Bambusa aurea*, Hort.). YELLOW BAMBOO. Diffuse, 10-15 ft. high, sts. yellow, often brilliant, internodes at base of plant very short: lvs. 2-5 or 6 in. long, ½-¾ in. broad, narrowed to a long acuminate point, minutely serrulate on one edge, finely tessellate, light green and mostly glaucous beneath; sheaths purplish, usually ciliate at top. China, Japan.

3. *P. viridi-glaucescens*, Riv. Tall hardy plant to 60 ft., with arched zigzag culms that are at first green but become dull yellow with age: lvs. 3-4 in. long, ½ in. or somewhat more wide, bright green above and whitened beneath, minutely sharp-serrate on one edge, finely tessellate; ligule of the sheath with fringed auricles. China, Japan.

4. *P. mitis*, Riv. Twenty to 60 ft., culms and sts. deep green but becoming yellow with age, the internodes at the base of the plant not very short: lvs. 2-4 in. long and ¾ in. wide, light green, finely serrate on one border; sheaths marked purple. China, Japan.



5. *P. nigra*, Munro. BLACK BAMBOO. Hardy plant 10–20 ft.: culms and sts. green but becoming black the second year (bearing brownish-black spots in var. *punctata*, Hort.); joints prominent, nearly black on the upper rim and white-edged on the lower: lvs. thin, 2–6 in. long, nearly 1 in. broad or less, long-pointed, finely serrate on one edge, closely tessellate. China, Japan.

3. **BAMBUSA**, Schreb. Probably more than 100 tenable species, mostly in the tropics of the Old World; a good number are introduced to cult. in this country; erect or scandent woody plants, sometimes bearing spines.—Flts. bisexual or imperfect, in 2- to many-fl'd. spikes combined in glomerules on the branches of panicles, the rachilla jointed below the flts.; 3–4 lower glumes empty; stamens 6; ovary hirsute at top, with elongated divided or undivided style: fr. a thin-walled caryopsis with adherent seed: lvs. short-petioled, the blade articulated with the sheath. (*Bambu-sa*: from the aboriginal name in Malaya or adjacent regions.)

Lvs. striate in venation, the veins lengthwise and parallel with cross-veins lacking or not evident.

Plant spine-bearing.....1. *B. arundinacea*

Plant not spiny.....2. *B. vulgaris*

Lvs. conspicuously tessellate, the cross-veins making a network (seen under a lens or by holding lf. to the light).

Width of lvs.  $\frac{1}{2}$  in. or less.....3. *B. disticha*

Width of lvs.  $1\frac{1}{2}$  in. or more.

Lf. with tomentose line on side of midrib.....4. *B. tessellata*

Lf. without the tomentose line.....5. *B. palmata*

1. *B. arundinacea*, Willd. A giant bamboo with stout rootstocks, the dense clumps reaching 100 ft. in height: culms green and shining when young and zigzag, becoming straight and golden-yellow, the graceful curving branches bearing spines: lvs. 4–8 in. long,  $\frac{1}{2}$  in. or more broad, nearly glabrous: plant monocarpous—perishing after producing a crop of seeds, but the crop may be long delayed: panicle of great size. India.

2. *B. vulgaris*, Schrad. FEATHERY BAMBOO. Tender plant, withstanding little frost, 50–80 ft. high: culms stout, becoming 4 in. or more in diam., bright green, arching with age, the branches many and striate, not spine-bearing: lvs. 6–10 in. long,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. broad, rough on the margins and near them and also on the lower surface, striate and not tessellate: panicle large and leafy, with large clusters of spikelets at the nodes. Java, but widely cult.—Var. *aureo-variegata*, Hort., the GOLDEN BAMBOO, has golden-yellow culms with pencilings of green.

3. *B. disticha*, Miq. Dwarf, rising 2–3 ft., sometimes erroneously known as *B. nana*: culms slender, zigzag, green or tinged purple, the branches borne singly: lvs. 2 or  $2\frac{1}{2}$  in. long,  $\frac{1}{2}$  in. or less broad, tessellate, serrate on both edges, the sheaths overlapping, the spreading blades rather close together and parallel, giving the plant a striking appearance. Nativity undetermined.

4. *B. tessellata*, Munro (*B. Ragamowskii*, Hort.). Dwarf, 3–4 ft., hardy: lvs. very large, 12–18 in. long and  $1\frac{1}{2}$ –4 in. broad, smooth and shining above and whitened beneath, beautifully tessellate, sharply serrate, the midrib prominent and showing a tomentose line on one side. China and Japan.

5. *B. palmata*, Burb. (*Arundinaria palmata*, Hort.). Dwarf hardy plant, 2–5 ft., making broad clumps: lvs. large, 10–15 in. long and 2–3 in. or more broad, smooth and shining above, lighter and minutely pubescent beneath, tessellate, with prominent longitudinal veins and with no tomentose line near the midrib. Japan.

4. **ARUNDINARIA**, Michx. About 100 recognized species in Amer. and Asia, mostly trop. but two American species native as far north as Va., Md., and Mo.; several species are frequently planted.—Fls. mainly bisexual, in 2- to many-fl'd. flattened often large spikelets disposed in racemes or panicles, the rachilla more or less articulated below the flts.; 1 or 2 lower glumes empty, the fertile scales longer, many-nerved; palea scarcely shorter than the lemmas; stamens 3; ovary usually hirsute at top, with 2–3-divided style and rather long plumose stigmas: fr. an oval or narrowly oblong thin-walled caryopsis with adnate seed: lvs. flat, short-petioled, articulated with the

sheath which is persistent: plant usually not arboreous, the culms (canes) simple or branched. (Arundinaria: Latin *arundo*, reed.)

- Lvs. striate in venation.
- Sheath of lf. smooth, not fringed at top. .... 1. *A. Falconeri*
- Sheath downy, fringed or ciliate at top. .... 2. *A. falcata*
- Lvs. prominently tessellate or cross-veined.
- Width of lvs. usually 2 in. or more. .... 3. *A. Veitchii*
- Width of lvs. usually 1 in. or less (in No. 7 from 1-2 in.)
- Foliage striped white. .... 4. *A. Fortunei*
- Foliage striped yellow. .... 5. *A. auricoma*
- Foliage not striped.
- Culms purple or purplish. .... 6. *A. nitida*
- Culms green or golden-yellow.
- Branches single in the axils. .... 7. *A. japonica*
- Branches clustered. .... 8. *A. Simoni*

1. *A. Falconeri*, Benth. & Hook. Culms slender, shrubby, 10-15 ft., when young bright green but when old yellow and the internodes sometimes white-waxy: lvs. 3-6 in. long and about  $\frac{1}{2}$  in. wide, oblong-lanceolate and bearing a few pellucid glands, striate, the margins serrate, smooth both sides, the ligule rounded and hairy: st.-sheaths 8-12 in., smooth, not fringed at the top, the ligule dark and hairy: racemes short and sinuous. (*Falconeri*: Hugh Falconer, 1808-1865, student of Indian botany.) Himalaya.

2. *A. falcata*, Nees (*Bambusa falcata*, Hort.). Culms very slender, annual, 10-20 ft., but not exceeding  $\frac{1}{2}$  in. diam., with a bluish-white waxy coating when young but becoming yellow-green: lf.-blades much as in No. 1, but serratures less pronounced; sheaths downy, ciliate at the top: racemes falcate, fascicled at the nodes. Himalaya.

3. *A. Veitchii*, N. E. Br. (*Bambusa Veitchii*, Carr.). Dwarf, 3 ft. or less: culms purple, white-waxy below the nodes: lvs. 5-8 in. long and about 2 in. broad, bright green above, pale and minutely pubescent beneath, the margins serrate. (Named for John Gould Veitch, 1839-1867, English nurseryman.) Japan.

4. *A. Fortunei*, Riv. (*Bambusa Fortunei*, Van Houtte). Dwarf, 1-3 ft., with vigorous rhizomes, the internodes of the culms usually only an inch long: lvs. 4-5 in. long,  $\frac{3}{4}$  in. or less broad, striped with white. (For Robt. Fortune, page 447.) Japan.

5. *A. auricoma*, Mitf. (*A. Fortunei* var. *aurea*, Hort.). Plant 2-3 ft., strict: internodes 3-5 in.: lvs. 4-6 in. long, 1 in. wide, brightly striped yellow, strongly pubescent beneath, serrate particularly on one margin, rounded at base and very short-petioled, the hairy sheaths purplish. Japan.

6. *A. nitida*, Mitf. Hardy, to 10 ft.: culms size of a lead-pencil, black-purple: lvs. 2-3 in. long and  $\frac{1}{2}$  in. broad, shining green above and pale beneath; sheaths purple, ligules not hairy or ciliate. China.

7. *A. japonica*, Sieb. & Zucc. (*Bambusa Metake*, Sieb.). Hardy, commonly planted, 5-10 ft.: culms somewhat covered with waxy bloom; bud a simple flattish scale; branches borne singly in the axils: lvs. 4-10 in. long, 1-2 in. broad, smooth and shining above, whitened and minutely pubescent beneath; sheaths large and conspicuous. Japan.

8. *A. Simoni*, Riv. (*Bambusa Simoni*, Carr. *B. viridi-striata*, Hort. *B. Narihira*, Hort.). Hardy, to 20 ft.: culms with conspicuous waxy bloom; bud complex and scaly; branches in dense somewhat verticillate clusters in the axils: lvs. 6-12 in.,  $\frac{1}{2}$  in. or less broad, tapering to very long point, sometimes striped white, the midrib glaucous on one side toward the apex but green on the other side. (*Simoni*: Simon Brothers, nurserymen at Metz, in Alsace.) Himalaya to Japan.

5. **EUCHLÆNA**, Schrad. Probably 2 or 3 species, native in Mex. and Cent. Amer., one of which is cult.—Maize-like monœcious broad-leaved prominently jointed plants: staminate spikelets 2-fld., collected in a terminal panicle; pistillate spikelets with 1 ft., (a rudimentary ft. below) single, on opposite sides of a thickened zigzag jointed rachis, sunken in its cavities, the hardened first glume closing the cavity; these spikes, each wrapped in a little husk, clustered 2 or 4 together in the lf.-sheaths, the long styles protruding from the mouth of the sheath; spikes disarticulating at maturity into trapezoid joints, each permanently inclosing the grain. (*Euchlæna*: Greek *well covered*, probably alluding to the fruiting spikes.)

*E. mexicana*, Schrad. (*Reana luxurians*, Dur.). TEOSINTE. Coarse annual to 10 ft. and more, branching from the base, very leafy, smooth, the culm between the dark-colored fruiting nodes flattened on one side: lvs. sword-shaped or narrower, long-pointed, midrib prominent, the expanded sheath very strongly veined: grain about  $\frac{1}{4}$  in. long, shining, with a pupa-like marking on the face. Mex.; planted far S. for forage.

6. *ZEA*, L. Coarse annuals of many forms, but considered to represent a single species or at least a single origin; although evidently of American origin, the nativity of the plant is unknown, some students supposing it to be a derivative of teosinte or a hybrid between it and some plant yet unrecognized. —*Zea* differs from *Euchlæna* in the many-rowed ear with its continuous rachis or cob and the very different flat grains, the rows supposed to represent pistillate spikes; potentially each node may bear an ear, or even more than one, but usually only one to three ears are produced to a stalk and but one at a node; sometimes staminate flts. are produced at the tip of the ear, and pistillate flts. (bearing rounded grains) may be borne in the tassel or staminate infl. (*Ze-a*: old Greek name for some cereal.)

*Z. Mays*, L. MAIZE. INDIAN CORN. Plant low or tall, 3–12 ft. and more, strict, suckering at the base but otherwise usually unbranched, with brace-roots springing from the lower joints: lvs. 1 at every joint or node, long sword-shaped or linear-lanceolate, acuminate-pointed, curving, with prominent rib: staminate spikelets 2 at each node in the panicle or tassel, one sessile or nearly so and one pedicelled, each spikelet 2-fld. with empty ciliate glumes, thin palea and lemmas, the stamens 3; pistillate spikelets in 8–24 rows on the rachis, the floral envelopes consisting of 2 glumes, 2 palea, 2 lemmas, and left as chaff on the cob (except in pod corn), the style from the single pistil very long and constituting the "silk": fr. a flattened grain with convex or indented top and more or less pointed base. (*Mays*: a name used by the American aborigines.)—Var. *tunicata*, St. Hil. (*Z. tunicata*, Sturt.). POD CORN. Floral parts enlarging so that each kernel is inclosed in a husk; supposed by some to be near the original form. Var. *japonica*, Koern. (*Z. japonica* and *Z. japonica vittata*, Hort.), is grown for its ornamental foliage, which is longitudinally striped with yellow and nearly white and sometimes with pink. Var. *gracillima*, Koern. (*Z. gracillima* and *Z. minima*, Hort.) A very dwarf narrow-leaved green form grown for ornament. Var. *evarta*, Bailey (*Z. evarta*, Sturt.). POP CORN. Kernel small, usually much pointed at base and sometimes at apex, containing much hard endosperm that explodes or pops when heated, turning the kernel inside out: ear and plant small. Var. *indurata*, Bailey (*Z. indurata*, Sturt.). FLINT CORN. YANKEE CORN. Kernel hard and smooth on top, due to the thick corneous wall: ears usually long and slender, mostly brown-yellow at maturity: plant mostly of medium size, often strongly suckering. Var. *indentata*, Bailey (*Z. indentata*, Sturt.). DENT CORN. Kernel falling in or becoming indented at the top: ears usually relatively short, thick and heavy, yellow or white: the main corn of the U. S.: plant usually tall. Var. *rugosa*, Bonaf. (*Z. saccharata*, Sturt. *Z. Mays* var. *saccharata*, Bailey). SWEET or SUGAR CORN. Kernel much wrinkled, the horny endosperm more or less translucent, sweet: plant small or intermediate in size.

7. *COIX*, L. Three or four tall branching leafy species in the E. Indies and Asia, one well known as a curiosity and for its yield of beads.—Monœcious, the staminate spikelets terminating the infl.: fl.-clusters terminal on axillary simple peduncles; pistillate spikelets (1 fertile, 1 or 2 sterile) borne inside a hollow globular or ovoid body representing a lf.-sheath and which at maturity becomes a very hard dense structure that is used as a bead; staminate spikelets several, in pairs on the axis that projects from the bead, falling at maturity. (*Co-ix*: old Greek name.)

*C. Lacryma-Jobi*, L. Annual, 2–6 ft., loose-growing, prominently jointed, smooth: lvs. large, sword-shaped, long-pointed, with prominent midrib and a short basal sheath: peduncles 1 to several from upper sheaths, 1–3 in. long, bearing a single bead about  $\frac{1}{4}$  in. across and  $\frac{1}{2}$  in. long which becomes shining white or lead-color or violet at maturity: fr. with the fl.-chaff filling the bead, a smooth plump kernel. (*Lacryma-Jobi*: *tears of Job*, a fanciful allusion to the large tear-like bead-sheaths.) E. Asia and Malaya.—Long and widely grown for the beads, which are used in

rosaries and other articles; also for ornament and curiosity in the flower-garden; also forms of it as cereal foods in parts of Asia, as the Adlay of the Philippines; used medicinally; run wild in trop. countries.

8. **HOLCUS**, L. (*Sorghum*, Moench). Annual and perennial warm-country stout grasses of probably several species, native in the Old World, grown for grain, sirup, and forage.—Spikelets in 2's or 3's, of which the central or lower one is perfect and 1-fl'd., the others staminate and 1-fl'd., the former sessile and the latter prominently pedicelled; infl. a terminal open or close panicle, the rachis and pedicels hairy; staminate spikelets soon falling; stigmas exerted laterally; stamens 3. (Hol-cus: Latin, a kind of grain.)—The forms are very many, and the botanical origin of them unknown. The generic name, even, is in dispute: they may be included in the large genus *Andropogon*; or if separated, they may take the name *Sorghum* which was used in pre-Linnæan times and which was taken up by some post-Linnaean botanists; or they may reside in *Holcus* to which Linnaeus clearly assigned them. Although the external differences between johnson-grass and the sorghums are striking, yet there are reasons for supposing that all the cult. sorghums and kafirs may have been derived from it, but it is more probable that they represent two divisions of the genus. Two species are usually recognized, *H. halepensis* and *H. Sorghum*; the status of the others is less certain.

Spikelets readily deciduous at maturity: forage grasses.

Plant perennial, with extensively invading rootstocks: spikelets usually awnless or not prominently awned.

Plant annual: spikelets mostly with awns.

Panicle ovate or pyramidal in outline.

Panicle very narrow and long.

Spikelets persistent at maturity: grain-bearing and sirup-yielding plants.

1. *H. halepensis*, L. (*Andropogon halepensis*, Brot. *Sorghum halepensis*, Pers.).

JOHNSON-GRASS. MEANS-GRASS. ALEPPO-GRASS. Persistent perennial where not killed by frost, making strong creeping large-sheathed rootstocks: culms 3-6 ft high, glabrous, very leafy: lvs. with long sheath and short scarious ciliate ligule, the blades smooth or scabrous on the edges, many-nerved, the midrib conspicuous: panicle loose and spreading, to 2 ft. long, branches 2 or 3 at a node and more or less drooping: terminal spikelets in 3's, the lateral mostly in 2's, muticous or short-awned; fertile spikelet in the middle or at the base of the sterile, elliptic to broad-lanceolate, pubescent or smooth; staminate spikelets narrower, soon falling and leaving the slender hairy pedicels. Probably Mediterranean, but now widely scattered and naturalized.—A hay and pasture grass in mild countries, but also a bad weed. Introduced into the U. S. by Wm. Johnson of Ala. and Gov. Means of S. C.

2. *H. sudanensis*, Bailey (*Andropogon Sorghum* var. *sudanensis*, Piper. *Holcus Sorghum* var. *sudanensis*, Hitchc. *Sorghum sudanense*, Stapf). SUDAN-GRASS. Annual, very like No. 1, the spikelets usually prominently awned: culm rather slender, 6-10 ft.: lvs. many, ½ in. or less wide: panicle ovate or pyramidal, 6-12 in. long and half as broad, the slender ascending branches whorled: spikelets oblong or elliptic, mostly brownish. Afr.—Somewhat planted for forage far S.

3. *H. virgatus*, Bailey (*Andropogon Sorghum* var. *exiguus*, Piper. *Holcus Sorghum* var. *exiguus*, Hitchc. *Sorghum virgatum*, Stapf). TUNIS-GRASS. Annual: marked by its very narrow slender open panicle which is 6-24 in. or more long, and by the narrowly-lanceolate green spikelets which are finely awned. Afr.—Introduced for forage.

4. *H. Sorghum*, L. (*Andropogon Sorghum*, Brot. *Andropogon Sorghum* subsp. *sativus*, var. *vulgaris*, Hack. *Sorghum vulgare*, Pers.). SORGHUM. Strong erect annuals looking like Indian corn when not in bloom, although the foliage is usually narrower: culms 4-12 ft. or more, prominently jointed and sheathed, sometimes producing brace-roots and frequently sprouting from the stumps after harvest, the pith in some kinds juicy and in others dry: panicles terminal, of many kinds; spikelets large and broad, hairy, the lemmas awned or awnless. (Sorghum: a word of possibly E. Asian origin.) Afr. probably, but exact nativity unknown. Of the great range of vars., some of them grown in other parts of the world and known here mostly in an experimental way, only a few need be treated here.

A. Sweet sorghums, with sweet juicy pith, grown for the making of sirup from the stalks and also for fodder; panicle open or compact.



Var. *saccharatus*, Bailey (*Holcus saccharatus*, L. *Sorghum saccharatum*, Pers. *Andropogon Sorghum* var. *saccharatus*, Aef.). SORGHO. SWEET or SUGAR SORGHUM. A heterogeneous series in descriptive botanical characters but constituting a cultural group, grown for the sweet juice from which sirup is made; herbage used as fodder: panicle dense or loose, mostly erect but sometimes recurved (peduncle goose-necked), ovate to cylindrical in outline; spikelets ovate to obovate, awned or awnless: culms 5-12 ft.—Sometimes erroneously called sugar-cane.

b. *Sorghums*, grown for the long stiff rays of the panicle.

Var. *technicus*, Bailey (*Andropogon Sorghum* var. *technicus*, Koern. & Wern.). BROOM-CORN. Panicle or "brush" long and loose, in the large kinds 18-30 in. long and the plant 10-15 ft. high, in the dwarf kinds 12-24 in. long and the plant 4-6 ft.; rays of the panicle naked below, stiff, arising from nearly a common point or part but branching toward the end; spikelets usually awned.

c. *Grain sorghums*, grown for the kernels in the infl., sometimes for fodder.

i. *Mature panicle with short branches but more or less open or loose; grains mostly small.*

Var. *Drummondii*, Hitchc. (*Andropogon Drummondii*, Nees. *Andropogon Sorghum* var. *Drummondii*, Hack. *Sorghum Drummondii*, Nees.). CHICKEN-CORN. Annual, more or less spontaneous in cult. ground in La. and Miss.: culms few or solitary, 6 ft., the lvs. pale and flat: panicle pyramidal-oblong, erect and rather dense, 12-16 in. long, the branches ascending; lower glume of fertile spikelet elliptic, constricted at base; grain oval, orange-colored, not exposed. Guinea; named for Wm. Drummond who collected specimens at New Orleans in 1832.

Var. *Roxburghii*, Bailey (*Andropogon Sorghum* var. *Roxburghii*, Hack. *Sorghum Roxburghii*, Stapf). SHALLU. Annual: culms stout and tall, often somewhat waxy: panicle oblong or ovoid-oblong, erect, mostly contracted and dense or becoming loose at maturity, the slender branches verticillate; spikelet ovate and acute, tawny; glumes equal, lower 10-13-nerved, upper 7-9-nerved; grain elliptic, often exposed. (Bears the name of Wm. Roxburgh, botanist of India.) Afr., India.

iii. *Mature panicles compact, often dense, the spikelets clustered; grains large.*

Var. *Durra*, Bailey (*Holcus Durra*, Forsk. *Sorghum Durra*, Stapf). DURRA. Medium to stout annual with dry or not sweet pith: panicle compact, ovate or broad elliptic, erect or inclined but mostly recurved (goosenecked); spikelets very broad, rhombic-ovate when in bloom, awned or awnless, hairy; lower glume with greenish usually strongly nerved tip; grain nearly globose to lenticular, with a rounded top, included. Nile region.—Yellow milo and Jerusalem corn are forms of *durra*.

Var. *caffrorum*, Bailey (*Holcus caffrorum*, Thumb. *Sorghum caffrorum*, Beauv.). KAFIR. Mostly stouter and taller, the pith dry or subacid: panicle oblong or cylindric, dense, erect; spikelets elliptic-ovate, loosely hairy, short-acute but not awned; glumes about half as long as the broad or obovate subglobose grain. (Caffrorum: of the Kafirs.) S. Afr.—Red, White and Blackhull kafirs are leading vars.

Var. *caudatus*, Bailey (*Sorghum caudatum*, Stapf). FETERITA. Tall, slender or stout, 6-14 ft.: panicle oblong, often very narrow, very dense, erect, the branches somewhat flexuose, at maturity sometimes spreading open; spikelets elliptic-oblong with rather straight sides, muticous, hairy or glabrous, acute or rarely with short awns: grain broad-elliptic or orbicular, more or less compressed, white, yellow, or red. Cent. Afr.

9. **SACCHARUM**, L. A dozen species of tall grasses, mostly of the Old World tropics, one the principal source of cane-sugar.—Infl. a large terminal panicle; spikelets in pairs at the articulating joints of the rachis, each 1-fl'd. and perfect or the upper one rarely pistillate, one spikelet sessile and one pedicelled, a tuft of long soft hairs subtending each spikelet; stamens 3; styles long and plumose; fr. free. (Sacchar-um: from an old Greek word for sugar.)

S. *officinatum*, L. SUGAR-CANE. Stout coarse strong perennial 6-15 ft. tall, yielding sugar from the solid jointed maize-like canes: lvs. stiff and 1-several ft. long, 1-2 in. broad, glabrous and smooth on both surfaces but sharp-serrate on the margins, midrib broad, long-attenuate-pointed; sheaths long, more or less overlapping, hairy at the throat, ligule prominent: panicle terminal, 1-2 ft. long, open and fluffy; rachillae and pedicels disarticulating, liberating the immense number of little spikelets with their white downy tufts.—Probably a cultigen, the original species not having been discovered; supposed to be native in farther Asia or E.



Indies. The plant is propagated by pieces of the culm. It does not bloom in the U. S., but flowers freely in the tropics and some kinds produce seeds with which experiments in breeding have been made in recent years.

10. **ERIANTHUS**, Michx. About a score of tall stout perennial grasses in temp. and trop. regions on both sides of the globe, one grown for ornament.—Spikelets 2 at the nodes of the jointed disarticulating rachis, one sessile, one pedicelled, perfect, mostly 1-fl., with a tuft of silky hairs at the base of each; glumes nearly equal, the first or lower somewhat double-keeled and the upper keeled toward the apex; one lemma sterile and awnless, the other with a straight or twisted awn; stamens 3; axis of panicle elongated: lvs. long and flat. (Erianthus: Greek *wool-flower*, from the silky hairs.)

**E. Ravennæ**, Beauv. **PLUME-GRASS**. **RAVENNA-GRASS**, from the specific name, referring to Ravenna, Italy. Strong perennial to 12 ft., hardy as far north as N. Y. City: culm stiff, glabrous: lvs. about  $\frac{1}{2}$  in. wide, long and long-pointed, more or less scabrous on the nerves, midrib prominent and lighter-colored, the sheaths very long, many-striate, scabrid, with long hairs at the throat: panicle plume-like, 1-2 ft. long, narrow, soft-silky shiny from the great quantity of tufts subtending the spikelets, giving the plant a pampas-grass effect and for which it is grown. S. Eu.

11. **MISCANTHUS**, Anderss. (*Eulalia*, Trin.). Half-dozen or more Asian tall perennials, one of which is common as a lawn and border subject.—Spikelets 2 at the nodes of the rachis, 1-fl., one sessile or nearly so and one pedicelled, mostly awned, subtended by silky hairs; axis of panicle short: plants making very large heavy clumps with much foliage: differs from Erianthus in the rachis not disarticulating and in the short panicles. (Miscanthus: Greek *stem-flower*, probably indicating the pedicelled spikelets.)

**M. sinensis**, Anderss. (*M. polydactylos*, Voss. *Eulalia japonica*, Trin.). **EULALIA**. Strong hardy clumpy grass producing much herbage: culms 4-10 ft. high, glabrous, mostly inclosed in the many long glabrous finely striate sheaths which are not hairy at the throat: lf.-blades long,  $\frac{1}{2}$ -1 in. wide, long-pointed, margins more or less scabrous, midrib whitish and prominent: panicle open-spreading, 6-24 in. long, the main axis not continuing to the apex, the very slender long flexuous branches spreading or drooping, the spreading silky tufts conspicuous but not making a woolly cluster. China, Japan: sparingly spontaneous at places in this country.—Var. **variegatus**, Beal, **ZEBRA-GRASS**, has lvs. banded at intervals with yellowish. Var. **zebrinus**, Beal, **ZEBRA-GRASS**, has lvs. banded at intervals with whitish or yellowish. Var. **gracillimus**, Hitchc. (*Eulalia gracillima*, Hort.), has lvs. very narrow, usually  $\frac{1}{4}$  in. or less wide and strongly canaliculate.

12. **ANATHERUM**, Beauv. Two species, perennial, with long narrow panicles: spikelets in pairs, narrow, acute, mostly appressed, ours awnless or sharp-pointed, one sessile and perfect, one pedicelled and staminate, the perfect spikelet bearing short sharp spines and somewhat flattened laterally; stigmas plumose; stamens 3. (Anatherum: Greek *without beard*.)

**A. zizanioides**, Hitchc. & Chase (*Phalaris zizanioides*, L. *Vetiveria zizanioides*, Nash). **VETIVER**. **KHUS-KHUS**. Culm erect, 4-7 or 8 ft. tall, glabrous: sheaths glabrous: lf.-blades stiffish, long and narrow,  $\frac{1}{2}$  in. or less wide, glabrous but rough on edges: panicle 6-12 in. long, very narrow, the ascending or strict branches 1-2 in. long and whorled. Trop. and subtrop. Asia, E. Indies.—Cult. far S. and in tropics for the very aromatic roots, which are employed in perfumery and medicine and for domestic use; also grown as a division plant, to which its numerous tall stiff culms adapt it; escaped in La.

13. **CYMBOPOGON**, Spreng. About 40 species, usually perennial, mostly native in the Old World tropics, some of them yielding fragrant oils.—Spikelets in pairs, some of the lower ones in each spike staminate, borne on a common peduncle which is supported by a sheathing spathe or bract: racemes often hairy: awns present or often absent in cult. kinds, otherwise much like Andropogon and Anatherum. (Cymbopogon: Greek *boat and beard*.)—This genus

comprises most of the oil-grasses of India, which are sometimes grown in Amer., the perfumery and drug product being obtained from herbage and roots: These plants are often included in Andropogon.

Joints of raceme hairy all over, the hairs covering or concealing the sessile spikelets.....1. *C. Schœnanthus*  
 Joints hairy or bearded only on the sides, the hairs not concealing the sessile spikelets.

Sessile spikelets concave on back, linear to lance-linear.....2. *C. citratus*  
 Sessile spikelets flat on back, lanceolate or broader.....3. *C. Nardus*

1. *C. Schœnanthus*, Spreng. CAMEL-HAY. Prized in former time for its yield of oil, but the product apparently now coming from other grasses: perennial, 2 ft., with fragrant herbage: basal sheaths tight, clasping, lf.-blades long, edges rough, sheaths persistent and expanded below: panicle narrow, comprised of dense fascicles, the joints villous all over; spikelet with very short straight awn; first or outer glume of sessile spikelet double-keeled. (Schœnanthus: Greek, an old substantive, *rush flower*.) N. Afr., S. Asia.

2. *C. citratus*, Stapf. LEMON-GRASS. Perennial: panicle large, usually very compound, loose, the branches slender and the ultimate branches somewhat nodding, the joints of the racemes bearded or villous along the sides; spathe-bracts long and narrow; sessile spikelets awnless, linear to linear-lanceolate, concave on the lower part of the back. Known only in cult.

3. *C. Nardus*, Rendle. CITRONELLA-GRASS. Perennial: panicle large and mostly compound; spikelets awnless, the sessile ones lanceolate or ovate-lanceolate or obovate-lanceolate, flat on the back. (Nardus: Latin form, through Greek, of *nard*, Asian name of the aromatic oil.) Known only in cult.

14. *STENOTAPHRUM*, Trin. Three creeping perennial grasses of wide distribution in warm and trop. countries, one used for lawn-making.—Low: culm compressed: infl. a straight or curved thickened spike in which the spikelets are sunken; spikelets 1-fl., with a staminate or empty fl. beneath, pointed, with a short hyaline glume or scale showing at the base. (Stenotaphrum: *narrow trench*, Greek, alluding to the pits holding the spikelets.)

*S. secundatum*, Kuntze (*S. americanum*, Sw.). ST. AUGUSTINE-GRASS. SHORE-GRASS. Small but stocky stoloniferous grass, rooting at the joints, the leafy culms rising 3-12 in. and bearing distichous branches at the nodes: lvs. short and flat, usually only 2-4 in. long, obtuse, the flat sheaths prominent: spikes stiff, terminal and from lateral branches, 2-5 in. long, with the spikelets sunken on one side; rachis breaking up at maturity. S. C. to Tex. and trop. Amer.—Popular far S. for lawns.

15. *PANICUM*, L. A great genus, probably 400 species, widely spread over the globe, very few of which are cult. subjects.—Annual or perennial grasses, mostly of small stature, with panicked or rarely racemose infl.: spikelets bearing 1 fertile fl., and beneath it 2 empty glumes and a neutral or staminate lemma; glumes unequal, the lower one often small or minute; lemma and palet of the fertile fl. more or less hardened, without evident nerves, the grain free within these tightly closed envelopes; bristles none subtending the spikelets. (Pan-icum, Pa-nicum: old Latin name, once applied to another plant.)—*P. maximum*, Jacq., Guinea-Grass, is grown in the tropics and sometimes along the Gulf coast for forage: perennial, 4-8 or 10 ft., in clumps, with panicle 1-2 ft. long with stiff branches in whorls. Afr. *P. texanum*, Buckl., Colorado-Grass, Texas Millet, native in the Colorado valley, Tex., is sometimes planted for forage: annual. *P. virgatum*, L., native in U. S., perennial with loose open panicles, is sometimes grown for ornament.

Plant annual: panicle with long naked peduncles or rays.....1. *P. miliaceum*  
 Plant perennial: panicle of many short or long racemes, more or less

1-sided.....2. *P. barbinode*

1. *P. miliaceum*, L. MILLET. Annual, 3-4 ft. or more: culm slender, glabrous or hairy, mostly simple: lvs. soft, narrow, long-pointed, sparsely hairy; sheaths loosely hairy, bearded at the throat: panicle drooping, with long more or less naked branches (whence the name Broom-Corn Millet), bearing the ovate-pointed strongly

nerved spikelets on slender pedicels: fr. nearly globular, more than  $\frac{1}{4}$  in. across, straw-colored or white, smooth and shining. Probably E. Indies.—Cult. from earliest times, the millet of history; grown for the food grain and for forage. In N. Amer., not much grown, and as a forage plant, under the name of French Millet, Hog Millet, Proso Millet.

2. *P. barbinode*, Trin. PARA-GRASS. Perennial, decumbent at base and stoloniferous, spreading by the extensive rooting of the joints, the smooth culms rising 2–10 ft.: lvs. 6–18 in. long, flat, long-pointed, scabrous on edges; sheaths glabrous or hairy, ciliate at the throat: panicles open, more or less 1-sided, 6–15 in. long, of ascending closely fld. racemes; spikelets ovoid-pointed, strongly nerved, the lower glume pointed: nodes bearded. Brazil.—Grown in tropics and warm regions for hay and forage.

16. *ECHINOCHLOA*, Beauv. About a dozen annuals and perennials, of warm countries, some of them weeds and one or two cult. for forage and for the grain.—Infl. comprised of short or long racemes arranged in a heavy terminal panicle: lvs. ample, broad or narrow, with compressed sheaths: spikelets with 1 perfect flt., with empty lemmas or a staminate flt. beneath, the sterile lemma and sometimes the second glume either awned or cusp-pointed: fr. pointed. (*Echinoch-loa*: Greek *hedgehog grass*.)—*E. Crusgalli*, Beauv., is the common barnyard grass, from which the following millets may be a derivative; the first sometimes called *E. Crusgalli* var. *edulis*.

*E. frumentacea*, Link (*Panicum frumentaceum*, Roxb.). JAPANESE BARNYARD MILLET. Stout coarse grass, 3–6 ft., branching, the angled culm smooth or just beneath the panicle scabrous, very leafy: lvs. long and wide, often 1 in. broad, long-pointed, scabrous, sheath naked at the throat: panicle narrow and compact, erect, the separate but contiguous racemes erect-spreading or incurved; spikelets with short cusps rather than awns: fr. nearly  $\frac{1}{2}$  in. long, triangular-ovoid, pointed, plano-convex, keeled and 2-nerved on the back, remaining in its husk. Probably Asia and Afr.—Grown in N. Amer. for forage, in Asia also for the grain. *E. colonum*, Link, is grown in parts of the Old World for fodder and sometimes the grain for human food, now a weed in this country.

17. *OPLISMENUS*, Beauv. About 15 perennials and some annuals in the tropics and subtropics of both hemispheres, mostly weak with ascending base, one grown for ornament.—Spikelets solitary or paired, nearly sessile, in two rows on a slender rachis, the racemes alternate and rather distant on the axis; glumes approximately equal, 2-lobed or slightly notched at apex with an awn between the lobes; sterile lemma exceeding glumes, sharp-pointed or short-awned; fertile lemma convex, acute, clasping the palet; styles long, the stigmas plumose; stamens 3. (*Oplis-menus*: Greek *awned*.)

*O. compositus*, Beauv. (*O. hirtellus*, Hort., not Beauv.). Weak slender perennial, more or less trailing, rooting at the lower joints: culms 1–3 ft. or more long, many-jointed, glabrous or slightly hairy: lvs. short, flat and broad, to 4 in. long and  $\frac{1}{2}$ –1 in. wide, acuminate, glabrous or somewhat velvety beneath, the base mostly clasping at the top of the ciliate sheath: floral axis 3–4 in. long, bearing separated awned racemes  $\frac{1}{2}$ –1 in. long. Afr., trop. Amer.—Used for edgings, baskets, and underbench cover in greenhouses; the usual form, var. *vittatus*, has lvs. striped with white and pink.

18. *TRICHOLÆNA*, Schrad. Perennial and annual grasses in the eastern hemisphere, about 15 species, one of which is a forage plant far S.—Spikelets paniced, villous, on short very slender pedicels; lower glume much shorter than spikelet; upper glume and a sterile lemma equal, silky-hairy; fertile lemma inclosing the palet but the margins not inrolled, shorter than the spikelet; stamens 3. (*Tricholæ-na*: Greek *hair mantle*, referring to the villous spikelets.)

*T. rosea*, Nees (*T. violacea*, Hort.). NATAL-GRASS. RUBY-GRASS. Handsome perennial but cult. as an annual: culm slender, erect, 2–4 ft., glabrous: lvs. rather short, the blades on the culm 4–8 in. and  $\frac{1}{4}$  in. or less broad, fine pointed, glabrous or lightly hairy, sheaths sparsely hairy at least at throat: panicle open and graceful,

pink to red-brown, glossy and attractive, 3-10 in. long, the pointed silky spikelets shedding. S. Afr.—Grown in Fla. for forage, and sometimes planted for ornament; also sparingly escaped. Sometimes called "wine-grass."

19. **PENNISETUM**, L. Rich. Perennial and annual grasses, widely spread in trop. regions, about 50 species; one cult. in U. S. for grain and forage and others for ornament.—Infl. spicate in the cult. kinds (spicate panicle); perfect flt. 1, terminal in the spikelet, with staminate flt. beneath; spikelets subtended by involucrel bristles that are not united at the base and fall at maturity. (Pennise-tum: Latin *penna*, *seta*, feather, bristle.)

Involucrel bristles little, if at all, exceeding the spikelet and therefore not prominent on the spike: very tall annual. . . . . 1. *P. glaucum*

Involucrel bristles much exceeding spikelet and therefore prominent on the spike: ornamental perennials, often grown as border grasses: the FOUNTAIN-GRASSES.

Bristles naked, not plumose, although perhaps finely serrate.

Spike 1 on each culm, terminal.

Length of spike 2-5 in. . . . . 2. *P. alopecuroides*

Length of spike 8-12 in. . . . . 3. *P. macrostachyum*

Spikes 2 or more on each culm. . . . . 4. *P. latifolium*

Bristles, or some of them, plumose toward the base.

Length of spike 2-4 in. . . . . 5. *P. villosum*

Length of spike 6-10 in. . . . . 6. *P. Ruppelii*

1. ***P. glaucum***, R. Br. (*P. americanum*, Auth. *P. typhoideum*, Rich.). PEARL MILLET. INDIAN and AFRICAN MILLET. Stout and erect, 6-9 to 10 ft., with the aspect of maize, the culm with prominent nodes: lvs. long and narrow, 2-3 ft., scabrous on nerves and margin, the sheaths long and loose, ligule short and densely ciliate: spike single and terminal, long and dense as on cattail, 12-20 in. long, straight, about 1 in. thick at base and guarded by a lf.-like spreading bract, somewhat tapering or pointed at apex, the axis villous: spikelets mostly 2 together, subtended by unequal somewhat plumose bristles: fr. outgrowing the floral envelopes and bursting them, obovoid,  $\frac{1}{8}$  in. long, bluish or whitish. Nativity unknown: by some thought to be a cultigen, probably of hybrid origin.—Grown for forage and in warm countries for the grain which is used for human food; there are many forms.

2. ***P. alopecuroides***, Spreng. (*P. japonicum*, Hort.). Perennial, hardy in northern states, 2-4 ft. tall: culm slender, pubescent below the spike which stands above the foliage: lvs. long and narrow, bright green: spike 1, 2-5 in. or even 6 in. long, silvery in color, the large anthers purplish; bristles long and prominent, scabrous. China.

3. ***P. macrostachyum***, Trin. (*Gymnothrix macrostachys*, Brongn.). Perennial, 4-5 ft.: lvs. broad and flat: spike 1, 8-12 in. long. E. Indies.—A form with purplish foliage is var. *atropurpureum*, Hort.

4. ***P. latifolium***, Spreng. (*Gymnothrix latifolia*, Schult.). Perennial: culms 3-4 ft., ciliate at the nodes: lvs. about 1 in. broad, tapering to very long point, prominently many-veined, slightly scabrous, with a long sheath, ciliate at the short ligule: spikes several, green, nodding, 2-3 in. long, with long serrulate or pubescent bristles. Argentina.

5. ***P. villosum***, R. Br. (*P. longistylum*, Hort., not Hochst.). Perennial: culm 1-2 ft., pubescent beneath the spike: spike 1, 2-4 in. long, broad, with showy feathery bristles. Abyssinia.

6. ***P. Ruppelii***, Steud. (*P. Ruppelianum*, Hort.). Perennial, much planted in borders: culm 3-4 ft. high, gracefully curving, scabrous beneath the spike: lvs. long and narrow, numerous, sheaths long, ciliate at the ligule: spike 1, mostly curved or nodding, 6-10 in. long; bristles prominent, 1 in. or more long, the slender points scabrous. (Ruppelii: Edouard Ruppel, German botanist.) Abyssinia. —Usually grown with rose-colored, purple, and copper-colored spikes, the foliage also being colored. *P. atrosanguineum* and *P. cupreum*, Hort., belong here.

20. **SETARIA**, Beauv. (*Chætochloa*, Scribn.). About 60 annual or sometimes perennial grasses in warm countries but some of them extensively spread as weeds; one polymorphous species grown for fodder and grain.—Infl. spicate (spike-like panicle), terminating the culm: distinguished from Pennisetum largely by the persistent bristles which remain on the rachis after the spikelets have fallen. (Seta-ria: Latin *seta*, a bristle.)

Head or panicle thick and heavy: millet. . . . . 1. *S. italica*

Head or panicle long, slender and open: ornamental grass. . . . . 2. *S. palmifolia*



1. *S. italica*, Beauv. (*Chætochloa italica*, Scribn.). FOXTAIL MILLET. Strong-growing annual 3-5 ft. high, branching somewhat from the crown but the smooth prominently jointed culms mostly simple: lvs. many,  $\frac{3}{4}$ -1 in. broad, flat, long-pointed, scabrous, many-nerved, sheaths long and ciliate at the throat: spike terminal, thick, 1-12 in. long,  $\frac{1}{2}$ -2 in. diam., erect, curved or nodding, continuous or lobed, the bristles long or short and green, brown or purplish: fr.  $\frac{1}{4}$  in. long, ovoid, plano-convex, smooth, yellow, brown, red, or nearly black. Cultigen, perhaps derived from *S. viridis*, Beauv., which is now a wide-spread weed.—Foxtail millet is cult. in many forms, in this country for hay and forage but in some other countries as a cereal grain. Var. *stramineofructa*, Bailey, comprises forms with yellow fr. and very large spikes (which are often lobed), bristles variously colored, known as GERMAN MILLET and GOLDEN WONDER MILLET. Var. *rubrofructa*, Bailey, has reddish or orange fr. and purple bristles, comprising SIBERIAN and TURKESTAN MILLET. Var. *nigrofructa*, Bailey, with purplish or nearly black fr., small dense heads 3 in. or less long, and dark brown bristles is HUNGARIAN-GRASS.

2. *S. palmifolia*, Stapf (*Panicum palmifolium*, Willd. *P. plicatum*, Auth., not Lam. *Chætochloa palmifolia*, Hitchc. & Chase). PALM-GRASS. Slender perennial with flexuose culms rising 4-6 ft.: lvs. broad in the middle (to  $1\frac{1}{2}$  in.) and tapering both ways, running to a very fine point, 1-2 ft. long, strongly plicate-ribbed, sparsely hairy; sheaths more or less hairy, strongly ciliate on upper margins: panicle narrow and open, often interrupted, 8-12 in. long, comprised of many short rather loosely-fld. racemes; spikelets short-pedicelled, some of the upper ones often subtended by a single bristle (whence the plant shows its relation to *Setaria*), ovate, with strong green nerves, the empty glume broad, scarious-margined and obtuse. E. Indies.—Common in greenhouses, grown for its foliage, becoming spontaneous along the walks; also in the open S. There is a striped-leaved form.

21. *ORYZA*, L. A half-dozen paludose grasses of the E. Indies, one of vast importance as a grain-food.—Spikelets strongly flattened sideways, paniculate, perfect, 1-fld. with 2 small glumes; stamens usually 6: fr. with a linear hilum. (*Ory-za*: adaptation of the Arabic name *Eruz*.)

*O. sativa*, L. RICE. Handsome erect-growing grass of wet habitats (but there are races adapted to uplands), 3-4 ft., stooling: culm angled, smooth, nearly all of it inclosed in the glabrous strongly nerved lf.-sheaths: lf.-blades long, flat,  $\frac{1}{2}$  in. broad, more or less scabrous: panicle terminal, narrow, curved or nodding to one side, 6-12 in. long, with many long ascending branches; spikelets in bloom  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, very flat and very strongly ribbed, oblong, pubescent, awned or awnless; palet with 2 nerves near margin: fr. free inside the husk, oblong, flattened on the sides, with a very long hilum, straw-colored or yellow, becoming white when polished; there are red vars.—Escaped in some regions.

22. *ANTHOXANTHUM*, L. Less than a half-dozen annual and perennial aromatic species in Eurasia and N. Afr., two of them sparingly known as agricultural grasses.—Infl. spike-like at the top of the slender culm; spikelets 1-fld. with 2 lobed sterile slender-awned lemmas beneath, longer than the fertile flt.; lemma of the fertile flt. truncate and awnless; palet faintly 2-nerved; styles long and stigma plumose; stamens 2. (*Anthoxan-thum*: Greek *yellow flower*.)

Glumes pubescent; awn short, little noticeable: perennial.....1. *A. odoratum*  
Glumes glabrous or pubescent only toward base; awn prominent: annual...2. *A. aristatum*

1. *A. odoratum*, L. SWEET VERNAL-GRASS. Early-flowering perennial making small clumps: culms very slender, erect, naked above, glabrous and shining, 1-2 ft.: lvs. short, flat and soft, sparsely hairy: spicate panicle terminal, 1-3 in. long and  $\frac{1}{2}$  in. broad in anthesis, bronzy-green, often somewhat interrupted; sterile lemmas unequally awned, exceeding the fertile lemma. Eurasia.—Because of the very fragrant herbage the plant is often included in meadow-grass mixtures; also common as an introduced plant.

2. *A. aristatum*, Boiss. (*A. Puelii*, Lec. & Lam.). Annual, lower, lvs. mostly radical and very short, culm more or less flexuose, spike shorter and bearing more conspicuous awns. Eu.—Sometimes sown as a meadow-grass, and also spontaneous.

23. *PHALARIS*, L. About a score of annual and perennial upright grasses in temp. Eu. and N. Amer., two frequently planted.—Spikelets flattened



laterally, with 1 perfect flt. and 1 or 2 very small sterile lemmas beneath, the rachilla disarticulating above the glumes which are equal and boat-shaped; fertile lemma hard, shorter than the glumes; stigmas plumose; stamens 3: panicle close or semi-open, or spike-like. (Phal-aris: ancient Greek name.)

Plant annual: infl. spike-like; glumes winged, ..... 1. *P. canariensis*  
 Plant perennial: infl. narrow-paniculate; glumes not winged, ..... 2. *P. arundinacea*

1. *P. canariensis*, L. CANARY-GRASS. Annual, erect, 1-2 ft., the slender culm glabrous or somewhat scabrous: lvs. short, 3-6 in., long-pointed, several-nerved, lightly scabrous, upper sheaths inflated: spikes ovoid, peduncled; outer glumes widely winged on one side (keel) and therefore very broad, very short-pointed or mucous, white or yellowish with green stripes, the margins entire: "seeds" (fr. in integuments) lance-oblong, about  $\frac{3}{8}$  in. long, straw-colored and shining, compressed but convex on both sides, strongly few-nerved. Eu.—Grown for bird-seed, and also run wild. *P. minor*, Retz. of Eu., is to be looked for. It differs in the cylindric-oblong spike, the less winged and narrower sharp-pointed glumes that are notched or erose toward the apex.

2. *P. arundinacea*, L. REED CANARY-GRASS. Tall rather coarse perennial, 2-6 ft., native in N. Amer. and Eu. and sometimes transferred to grounds; known in cult. mostly in var. *picta*, L., RIBBON-GRASS (var. *variegata*, Hort.), with lvs. striped with white and yellowish, probably all introduced: lvs. flat, 6-12 in. long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. wide, mostly lightly scabrous, the ligule papery and prominent: panicle 4-8 in. long, loose in anthesis but becoming spike-like, the spikelets sharp-pointed but awnless.

24. AGROSTIS, L. BENT-GRASS. Annual and perennial narrow-leaved paniculate grasses of about 100 widely distributed species, most abundant in temp. regions; two or three have much agricultural value.—Spikelets small, 1-flid., in open graceful panicles that usually have capillary branchlets; glumes acute, nearly equal, mostly longer than the obtuse awnless or dorsally awned lemma, the palet less than the lemma or even wanting; styles short; stamens mostly 3: fr. free, but inclosed in the lemma. (Agros-tis: Greek *field*, the place of growth; in Latin *couch-grass*; from its use in this large genus of grasses is derived the name of grass science, *agrostology*, and grass student, *agrostologist*.)

Plant perennial: field and lawn grasses.

Palet minute or lacking, ..... 1. *A. canina*  
 Palet half or more as long as the lemma, ..... 2. *A. palustris*

Plant annual: ornamental grasses.

Spikelets awnless or essentially so, ..... 3. *A. nebulosa*  
 Spikelets prominently awned, ..... 4. *A. retrofracta*

1. *A. canina*, L. RHODE ISLAND BENT. BROWN BENT. Under this name a lawn-grass seed is known, but the seed is likely to be of other species: *A. canina* is a slender delicate grass, with culms 12-18 or 24 in. high, and erect fine glabrous culms, weak or reclining at base: lvs. short and very narrow, the lower ones almost setaceous and more or less inrolled: panicle with very slender hair-like branches, becoming contracted or narrowed at maturity; glumes one-fourth longer than lemmas, the latter with a bent awn borne below the middle; palet none or minute. Native.

2. *A. palustris*, Huds. (*A. alba*, Auct.). REDTOP. FIORIN. Culms erect from an inclined or decumbent base,  $1\frac{1}{2}$ - $3\frac{1}{2}$  ft. high, slender: lvs. short, flat and firm,  $\frac{1}{8}$ - $\frac{1}{4}$  in. broad, taper-pointed, the scarious ligule about  $\frac{1}{4}$  in. long: panicle 3-12 in. long, at first spreading but becoming narrower, green or reddish; lemma 3-nerved, nearly as long as the glumes, seldom short-awned, the palet one-half or more as long. Eu., and extensively naturalized here; also a common pasture- and meadow-grass.—*A. capillaris*, L. (*A. alba* var. *vulgaris*, Thurb. *A. vulgaris*, With.), is a smaller and more delicate form, usually found in open dry grassy fields, with fine lvs., shorter and usually redder panicle that is not contracted at maturity; ligule much shorter and usually truncate. *A. maritima*, Lam. (*A. stolonifera*, Hort., not L.). CREEPING BENT. Producing long stolons: panicle contracted, sometimes dense, the branches mostly appressed. Coasts and shores, and sometimes used in lawns.

3. *A. nebulosa*, Boiss. & Reut. (*A. capillaris*, Hort., not L.). CLOUD-GRASS. A dainty annual grass 1 ft. high, with few very narrow short lvs. overtopped by a diffuse very delicate open panicle 4-6 in. long, with verticillate fine branches: spikelets very small, long-pedicelled, shining, sometimes slightly awned; palet present. Spain.—Grown for ornament and dry bouquets.

4. *A. retrofracta*, Willd. (*A. laxiflora*, Hort.). Annual slender grass 1-2 ft., with very open large wide-spreading panicles much overtopping the narrow lvs., glabrous: spikelets borne at the ends of long capillary branches, each with a slender awn exceeding the acute glumes which are much longer than the florets. New Zeal., Australia, Hawaii, and introduced into U. S.

25. *ALOPECURUS*, L. Species about 30 of the north temp. zone, largely of cold climates, annual and perennial, one of them an agricultural grass.—Infl. spike-like; spikelets densely crowded, 1-fl'd., shedding from the axis; glumes equal and awnless, joined at the base, ciliate-keeled; lemma 5-nerved, obtuse, awned from below the middle; palet wanting; stigmas hairy; stamens 3. (*Alopecu-rus*: Greek *foxtail*.)

*A. pratensis*, L. MEADOW FOXTAIL. Perennial grass of meadow mixtures, distinguished from timothy by the mostly lower stature, shorter heads, and the many fine awns: culms simple and erect from creeping base, 1-2 to 3 ft., glabrous: lvs. short, the blades 1 6 in. long, flat, more or less scabrous, the sheaths somewhat swollen: spike 1 3 in., erect, well above the foliage; lemmas bearing a slender soft somewhat bent awn. Eu.; also naturalized in N. Amer.

26. *PHLEUM*, L. About 10 mostly perennial grasses in the temp. zone, one of them of great agricultural prominence in E. N. Amer.—Infl. dense and spike-like, terminating the culm, composed of a great number of compressed 1-fl'd. spikelets; glumes 2, keeled and usually prominently ciliate, awn-pointed, exceeding the thin 5-nerved lemma; styles long; stamens 3, exserted in anthesis: fr. free, but inclosed in the lemma and palet. (*Phle-um*: old Greek name for some other plant.)

*P. pratense*, L. TIMOTHY. HERDS-GRASS. Perennial, strong-growing: culms 2-5 ft., simple, smooth, erect or ascending from a somewhat thickened bulb-like base: lvs. many from both crown and culm, flat, variable in width and length but  $\frac{1}{4}$  in. broad in large plants and 1 ft. long; sheath long and striate, smooth, ligule thin: spike cylindrical,  $\frac{3}{4}$ -8 in. long, obtuse, continuous or interrupted below; glumes so placed that the appressed awn-points seem to be on the outer edges of one truncate scale, the spreading hairs conspicuous under a lens; anthers long-exserted. Eu., extensively naturalized in N. Amer., and a leading meadow-grass.

27. *LAGURUS*, L. One annual grass of the Medit. region, grown for ornament, and also sparingly run loose in Calif.—Spikelets 1-fl'd., combined into an ovoid or oblong head; rachilla extending as a bristle beyond the palet, disarticulating above the glumes, hairy beneath the flt.; glumes villous, 1-nerved, awn-pointed, exceeding the lemma which bears a slender exserted awn; stigma plumose; stamens 3. (*Lagu-rus*: Latin *hare's tail*.)

*L. ovatus*, L. HARES-TAIL-GRASS. Erect, 1-2 ft., bearing a soft-woolly head 1-2 in. long, with slender awns projecting  $\frac{1}{2}$  in.: sheaths and lf.-blades soft-hairy.—Grown in pots and for dry bouquets.

28. *STIPA*, L. SPEAR-GRASS. One hundred or more perennial grasses in temp. and trop. regions, a few of which are sometimes grown for ornament.—Infl. paniculate; spikelets 1-fl'd., separating above the glumes, which are thin or papery and acute to awned; lemma terete, convolute, concealing the 2-nerved palet, ending in a conspicuous awn which is usually twisted or bent; styles short and distinct; stamens usually 3: lvs. mostly convolute. (*Sti-pa*: Greek *tow*, alluding to plumose awns.)—The awns often manifest odd hygroscopic action when the frs. are planted. *S. tenacissima*, L., of Spain and N. Afr., is Esparto-grass, one of the sources of esparto paper and cordage.

Awns not plumose.....1. *S. elegantissima*  
Awns plumose.....2. *S. pennata*

1. *S. elegantissima*, Labill. Culms erect from a horizontal rhizome, 2-3 ft.: panicle loose and open, 6-8 in. long, the branchlets and pedicels (but not the bent awns) plumose; spikelets  $\frac{1}{4}$ - $\frac{1}{3}$  in. long; awn 1  $\frac{1}{4}$  in. Australia.

2. *S. pennata*, L. FEATHER-GRASS. Tufted, 2-3 ft.: panicle close and narrow; glumes  $\frac{1}{2}$  in. or more long, with awn twice or more as long; awn of lemma often 1 ft. long, smooth and twisted below, very plumose and feathery above, making a handsome effect. Eurasia.

29. *AVENA*, L. About 50 grasses, mostly annual species, of the cooler temp. regions, oats being one of them.—Plants of diverse habit but agreeing in a loose paniculate infl., 2-6-fld. spikelets with beards beneath the flts., many-nerved glumes large and membranaceous and nearly equal, lemmas hard, 2-toothed at apex, and usually bearing a long twisted awn from the back (but the awn sometimes lacking or modified in cult. kinds); flts. often disarticulating and falling intact; fr. free or tightly inclosed in the unrolled lemma and palet. (Avena: the classical Latin name of the oat.)

Flts. disarticulating and easily shedding from the large glumes; lemmas hairy; awn developed.

Glumes nearly 2 in. long; awns 2-3 in. .... 1. *A. sterilis*  
Glumes about 1 in. long; awns about 1-1½ in.

Lemma-teeth awned. .... 2. *A. barbata*

Lemma-teeth acute. .... 3. *A. fatua*

Flts. not readily disarticulating, remaining in the glumes; lemmas glabrous or nearly so; awn short or wanting.

Grain permanently inclosed in the lemma or hull. .... 4. *A. sativa*

Grain separating from the hull. .... 5. *A. nuda*

1. *A. sterilis*, L. ANIMATED OAT. Annual, 2-3 ft., with panicles 6-12 in. long; spikelets long, the glumes nearly or quite 2 in. long; awns 2 in. or more long, with a prominent twisting lower part; lemmas densely hairy. Medit. region and eastward.—Grown as a curiosity, the mature flts. twisting and moving when planted or placed on the ground, due to hygroscopic action of the awns. *A. fatua* is sometimes grown under this name.

2. *A. barbata*, Brot. SLENDER WILD OAT. Annual, 2-3½ ft., with slender panicle 6-12 in. long, the spikelets slender and narrow, 2-several-fld., the glumes about 1 in. long; lemma lightly hairy, 7-nerved, awn-toothed; awn from back of lemma 1-1½ in. long, bent. S. Eu., naturalized on the Pacific coast and forms parts of the wild-oat hay.

3. *A. fatua*, L. WILD OAT. Annual, 2-3 or 4 ft. high, tufted: panicle 6-12 in. or more long, stout, with drooping 2-fld. broad spikelets, the glumes 1 in. or less long; lemma 9-nerved, the marginal nerves faint, with stiff usually brownish hairs, the teeth acute but not awned; awn from the back 1-1½ in. long, bent. Eu., Asia.—Introduced, and on the Pacific coast established and constituting part of the wild-oat hay.

4. *A. sativa*, L. OAT. Erect tufted annual, 2-3 or 4 ft., with culm smooth, or scabrous beneath the panicle: lvs.  $\frac{1}{4}$ -½ in. broad, mostly short or medium in length (blade 6-12 in.), flat, more or less scabrous, the sheaths long and loose, ligule short and jagged: panicle terminal, 6-12 in. long, open and spreading on all sides or variously condensed, or (in the SIDE OATS) the branches hanging from one side; spikelets usually 2-fld.,  $\frac{3}{4}$ -1 in. long, slender-pedicelled; glumes strongly several-nerved; lemmas glabrous or with few hairs at the base, teeth acute, the dorsal awn absent, or one to a flt. and short (usually not exceeding  $\frac{1}{2}$ -¾ in.) and straight: fr. about  $\frac{1}{4}$ -½ in. long, narrow, with nearly parallel sides, hairy, grooved lengthwise on the face, tightly inclosed in the inrolled lemma which also covers the palet on the front, these envelopes constituting the hull or chaff. Cultigen; supposed to be derived from *A. fatua* for the most part, and some races (known mostly in other countries) from *A. sterilis* and *A. barbata*; the species is therefore not a homogeneous group.—The oat sometimes is spontaneous but does not long persist. The winter oat is any hardy race that may be planted in autumn, maturing the following year.

5. *A. nuda*, L. NAKED OAT. Spikelets usually more than 2-fld.: fr. free, escaping from the lemma as a naked grain. Probably a cultigen.

30. *ARRHENATHERUM*, Beauv. Species 6, perennial, in the Medit. region, much like *Avena* but the lower flt. in the spikelet staminate, the upper one perfect, an awn from one or both flts. (*Arrhenatherum*: Greek *masculine awn*, from the awned male flt.)

*A. elatius*, Mert. & Koch (*A. avenaceum*, Beauv. *Avena elatior*, L.). TALL OAT-GRASS. Tufted, erect, 2-4 ft.: culm very slender, glabrous or sometimes slightly pubescent at the nodes, sheaths glabrous: lvs.  $\frac{1}{4}$  in. or less wide, slightly scabrous, soft:

panicle 6-15 in. long, narrow, mostly interrupted, light green or purplish with a luster; spikelets 2-flid., the lower staminate and with an awn about  $\frac{1}{2}$  in. long, the upper perfect and sometimes with a shorter awn. Eu.—Sometimes sown as a meadow-grass; also naturalized. Var. *tuberosum*, Haiac. (*A. bulbosum*, Presl), bears a cluster or string of tubers at the surface of the ground; a striped-leaved form of it is in cult. for ornament.

31. **NOTHOLCUS**, Nash (*Holcus*, L., in part. *Ginannia*, Bubani, not Scop. nor Dietr.). Rather small perennial and annual grasses, about 8 species, one sometimes grown for ornament.—Infl. paniculate; spikelets 2-flid., first perfect and awnless, second staminate and short-awned on back of lemma, pedicel disarticulating; glumes about equal, exceeding the 2 fls.; stigmas plumose; stamens 3: fr. free. (Notholcus: *false holcus*, Greek; sometimes written Nothoholcus, but this is not the original spelling.)

**N. lanatus**, Nash (*Holcus lanatus*, L.). VELVET-GRASS. Perennial, 2-3 ft., with sheaths and short flat lvs. velvety: panicle 2-4 in. long, at length contracted or close, pale or purplish in color, soft to the touch; glumes ciliate on keel; fertile lemmas glabrous and shining, nearly or quite obtuse, the upper one bearing a minute hooked awn below the 2-toothed apex. Eu., and naturalized in N. Amer.—A kind with variegated foliage is sometimes cult.

32. **ASPRIS**, Adans. (*Aira*, Auth., not L.; *Aira* is now used in the place of *Deschampsia*). About 9 small species of the Medit. region, a few naturalized in N. Amer.; sometimes grown for ornament.—Spikelets 2-flid. (thereby differing from *Agrostis*, with which they are likely to be confused), in loose or contracted panicles, the rachilla disarticulating above the glumes which are about equal and acute; lemmas rounded, produced into 2 slender teeth, with short tuft of hairs, usually awned from below the middle; stigmas plumose; stamens 3. (*Aspris*: an old Greek name.)

**A. capillaris**, Hitchc. (*Aira capillaris*, Host). A small delicate annual grass, sometimes grown in pots for its profuse tops and perhaps for dry bouquets, 12-18 in. high, diffuse, with short capillary lvs. and spreading panicles with hair-like branchlets: spikelets light and small, the lower flt. bearing a short awn and the upper awnless. Eu.; naturalized in N. Amer.—Var. *pulchella*, Bailey (*Aira pulchella*, Link. *Agrostis pulchella*, Hort.), has both flts. awned.

33. **CHLORIS**, Sw. Species about 40, annual and perennial, mostly in trop. and subtrop. regions around the world, sometimes grown for forage and ornament.—Erect leafy grasses, with perfect spikelets sessile in 2 rows on one side of a slender rachis, the spikes few to several, aggregate and spreading at the summit of the culm; glumes keeled, unequal; lower flt. perfect, its lemma short-awned; upper 1-2 flts. rudimentary, the lemmas often reduced to 1-3 awns. (*Chloris*: Greek.)

**C. Gayana**, Kunth. RHODES-GRASS. Strong perennial producing running branches that root at the nodes: culms slender but erect, 3 to 4 ft. and more, flattened, glabrous or near the umbel scabrous, the brown nodes constricted: lvs. many, conduplicate when dry, scabrous: infl. a terminal spreading umbel, well above the foliage, of 6-15 narrow spikes 3 in. and more long; spikelets deciduous, leaving the sharp-pointed glumes. (*Gayana*: named after J. Gay, French botanist.) S. Afr.—Grown to some extent far S. for forage.

34. **ELEUSINE**, Gaertn. A half-dozen Old World annual and perennial grasses, one of which is cult.—Mostly not tall plants, tufted: infl. of several radiating or erect 1-sided spikes, forming a kind of terminal umbel, or one of the spikes beneath the others; spikelets several-flid., sessile and imbricated, in 2 rows; glumes shorter than the flt., unequal, keeled; lemmas ribbed and keeled. (*Eleusine*: Greek name of the town where Ceres was worshiped.)—*E. indica*, Gaertn., is a common weed.

**E. coracana**, Gaertn. (*E. Coracan*, Aschers. & Graebn.) AFRICAN MILLET. Coarse annual, 1-4 ft., grown in parts of the Old World for its grain and sometimes in this



country for ornament: culm stout, glabrous, much ensheathed: lvs. many, about  $\frac{1}{4}$  in. broad, soft, glabrous but somewhat scabrous, hairy in throat of sheath: spikes 5 or more, short and thick, 1–1½ in. and perhaps more long and more than  $\frac{1}{4}$  in. broad, upright, the lower one an inch or so remote; floral parts tapering, acute or muticous but not awned: fr. small, nearly globular, free, with a loose membranaceous pericarp. (Coracana is a rendering of an S. Indian vernacular name.) Probably Asia and Afr.

35. **CYNODON**, Rich. (*Capriola*, Adans.). Six small perennial grasses of the Old World and Australia, one of which is used for lawns and pastures in the S.—Creeping and stoloniferous: lvs. short and flat: infl. of several slender digitate spikes with articulated rachillæ; spikelets 1-flid., flattened, awnless, sessile in 2 rows on one side of the rachis; glumes narrow and acute, the lemmas broad and ciliate on the keel: fr. free. (Cyn-odon: *dog tooth*, probably in allusion to the tooth-like sheaths on the stolons.)

**C. Dactylon**, Pers. (*Panicum Dactylon*, L.). BERMUDA-GRASS. BAHAMA-GRASS. Culms rising 3–16 in. from the extensively creeping base, glabrous, terminated by 3–5 slender radiating 1-sided spikes  $\frac{1}{2}$ –2 in. long: lvs. mostly near base of culm and on the runners, short, the ligule hairy: spikelets small, pointed, sessile, appressed, imbricated; lemma exceeding the sharp glumes. (Dac-tylon: refers to the dactyls or fingers of the infl.) Eu., Asia, now widely spread over the globe.—A lawn and pasture grass in warm countries; also an invading weed and roadside cover.

36. **TRITICUM**, L. Annual and biennial grasses of perhaps 3 species, or a dozen more if *Ægilops* is included, of the Medit. region and W. Asia; source of bread-grain.—Erect plants with flts. in terminal spikes: spikelets 1 at each node or joint of the rachis (which is either articulating or continuous), placed flatwise, alternating, 2–5 flid.; lower 1 or 2 flts. perfect, the upper staminate or neutral; glumes ovate, 3- to many-nerved, often with an awn from glume and lemma: fr. free or remaining in the hull. (Trit-icum: Latin name for wheat.)

**T. æstivum**, L. (*T. sativum*, Lam. *T. vulgare*, Vill.). WHEAT. Annual, sown early in the year as Spring Wheat, or certain races in autumn as Winter Wheat, and maturing the following season, tillering at the base: culm erect, simple, 2–3 to 4 ft., glabrous or at the nodes somewhat pubescent: lvs. flat, about  $\frac{1}{2}$  in. wide and 8–15 in. long, taper-pointed, the long loose sheath glabrous or slightly pubescent, ligule short, thin and jagged: spike stout and erect, 1–4 in. long, cylindrical, or in the Club Wheats short and thicker toward the top, “bearded” (awned) or “smooth,” the rachis not breaking up: spikelets or “breasts” erect and appressed; glumes shorter than the spikelet, broader on the outer side and with a shoulder or projecting tooth on the upper angle, the keel awned or muticous; lemmas somewhat 3-toothed, the central tooth often an awn: fr. a free oblong grooved naked grain nearly or quite  $\frac{1}{4}$  in. long, pubescent at the top; the durum wheats have a longer more pointed kernel with the tip little or not pubescent; the English or Medit. wheats (*turgidum*) have a short thick scarcely flattened kernel. Var. **polonicum**, Bailey (*T. polonicum*, L., Polonia being the Latin name of Poland.), POLISH WHEAT, has glumes lanceolate, equaling or exceeding the spikelet, papery in texture.—The above description accounts for all the common wheats, in which the rachis of the spike remains intact and the grain is free from its integuments or chaff. Conceiving *T. æstivum* broadly, then the groups in which the rachis is articulated and breaks into pieces carrying the spikelets with them, the grain for the most part not separating from the floral parts, may be characterized as follows: Var. **monococcum**, Bailey (*T. monococcum*, L.). EINKORN. Spikelet 1-seeded, the other flt. not fertile; spike slender and long-awned, resembling a small-headed bearded wheat with much flattened spikelets; palea splitting into two parts; glumes with lateral tooth pointed. Var. **dicoccum**, Bailey (*T. dicoccum*, Schrank). EMMER. Spike heavy and dense, somewhat flattened, bearded; glumes tapering toward apex, with an acute tooth, prominently keeled. Var. **Spelta**, Bailey (*T. Spelta*, L.). SPELT. Spike slender, somewhat 4-sided, bearded, the spikelets well separated; glumes firm, pubescent, with one obtuse tooth but otherwise truncate, obscurely keeled.—Wheat is a cultigen, the species having been originally described and subsequently known only as a domesticated subject. Its origin is undetermined. The forms with articulated rachis are presumably nearest the aboriginal condition. The many domesticated races may not have had a direct common origin. It is probable that



*T. ægilopoides*, Bal., *T. dicoccoides*, Koern., and related wild grasses of the E. Medit. region and eastward, are approximate originals. The great group-races have probably originated in different geographical areas, but whether from autochthonous or early introduced stocks is yet undetermined.

37. **SECALE**, L. Three Eurasian grasses, one cult. for grain and forage.—Differs from *Triticum* in the subulate 1-nerved glumes: spikelets 2-fld., alternating on a long zigzag rachis; lemmas keeled and long-awned: fr. elongated, inclosed in the lemma. (*Seca-le*: old Latin name of some grain.)

**S. cereale**, L. RYE. Tall hardy tufted annual, 3-5 ft., with blue-green cast: culm slender but erect, overtopping the foliage, glabrous except pubescent near the spike, glaucous: lvs. many, rather soft,  $\frac{1}{2}$  in. or less broad, smooth or slightly scabrous, long-pointed; sheaths long and loose, the ligule short and jagged: spike terminal, 3-6 in. long, curved, much awned, narrow but closely fld., the spikelets with 2 fertile flts. and perhaps a third one rudimentary; lemmas long and narrow, tapering into awns, the keels prominently set with stiff points or teeth: fr. oblong, about  $\frac{1}{2}$  in. long, light brown, narrowly grooved on the face, short-pointed, glabrous. Cultigen; supposed to have developed from *S. montanum*, Guss., a perennial in the mts. of Eu. and Asia.

38. **HORDEUM**, L. About 16 to 20 species in temp. regions, annual and perennial, widely distributed; one an important grain and forage plant.—Spikelets 1-fld., 3 together in a "breast" at each node of the jointed rachis, alternating, one or all of the spikelets fertile, the lateral ones sometimes sterile and reduced to awns; when all are fertile and distinct, the head or spike is 6-rowed; when all are fertile and the outside spikes on the opposite sides overlap (as is usual), the spike is 4-rowed; when the central spikelet only is fertile, the spike is 2-rowed: glumes very narrow, like an involucre subtending the 3 spikelets; lemmas awned: fr. inclosed. (*Hor-deum*: ancient Latin name for barley.)

Plant biennial or perennial: spike nodding: cult. for ornament.....1. *H. jubatum*  
Plant annual: spike erect: cult. for grain and forage.....2. *H. vulgare*

1. **H. jubatum**, L. SQUIRREL-TAIL-GRASS. Biennial or perennial: culms 12-30 in. high, simple and erect (base sometimes inclined), slender: lvs. short: spike 2-4 in. long, gracefully curving and nodding, silvery-green or brown, with many very slender awns 1-3 in. long. Native; also in Eurasia.—A weed and often troublesome plant, but sometimes planted for ornament.

2. **H. vulgare**, L. (*H. sativum*, Pers.). BARLEY. Erect stout annual,  $1\frac{1}{2}$ -3 ft.: culm simple, glabrous or scabrous beneath the spike: lvs.  $\frac{1}{4}$   $\frac{3}{4}$  in. broad, rather short, long-tapering to the point; sheaths loose, glabrous, ligules short and thin: spike terminal, 3-4 in. long, densely fld., erect (vars. with nodding spikes), with many stout very long erect rough beards that far overtop the spike, the rachis not disarticulating; glumes narrow, short-awned; lemma longer, with a very flat awn 3-6 in. long: fr. elliptic, about  $\frac{3}{8}$  in. long, short-pointed, furrowed the length of the face, smooth, more or less tightly inclosed in the lemma and palea but sometimes (as in the hullless barley) quite free.—Var. *trifurcatum*, Alef., is a teratological beardless state in which the awns are represented by short furcate branches. Barley is a cultigen, probably derived from *H. spontaneum*, Koch, and perhaps *H. ischnatherum*, Schulz, wild plants of the Orient. The two-rowed barley, *H. distichon*, L., and the six-rowed, *H. hexastichon*, L., may be variants of a polymorphous species, known as *H. vulgare*, or represent different phyla in the evolution of the cult. group.

39. **LOLIUM**, L. RYE-GRASS. Species probably 6, of temp. Eurasia, annual and perennial; two are agricultural grasses.—Small, with flat lvs.: culm ascending or erect, simple; spikes terminal, interrupted; spikelets many-fld., flat, with the edge toward the culm, alternate, the rachis of the spike more or less zigzag; glume next the rachis small, the opposite one developed and 5-7-nerved; lemmas convex and with converging nerves, sometimes produced into awns. (*Lo-lium*: Latin name for one of the species.)

Spikelets not bearing awns.....1. *L. perenne*  
Spikelets with awns.....2. *L. multiflorum*

1. *L. perenne*, L. PERENNIAL OR ENGLISH RYE-GRASS. A pasture- and meadow-grass, and sometimes in lawns; tufted perennial, erect, glabrous, culms 1-2½ ft. high: lvs. abundant from the base, relatively few on the culms, narrow, flat, the sheaths glabrous and ligule very short: spike 4-12 in. long, straight or curved; spikelets 5-10-fld., with awnless lemmas; outer glume half or more the length of the spikelet.—There are crested forms.

2. *L. multiflorum*, Lam. (*L. italicum*, A. Br.). ITALIAN RYE-GRASS. Perennial, but mostly shorter-lived than No. 1: spikelets larger, with more flts., the lemmas conspicuously awned.—Both species have run wild in N. Amer., as also to a less extent has the Darnel, *L. temulentum*, L., in which the outer glume is longer than the spikelet and which produces a narcotic poison.

40. *FESTUCA*, L. FESCUE. Annual and perennial mostly small grasses, about 100 species widely distributed but most frequent in temp. regions; a very few are agricultural and lawn grasses.—Spikelets 2- or more-fld., in mostly narrow panicles: lvs. usually narrow and stiffish: glumes narrow and acute, unequal, the lower usually 1-nerved and the other 3-nerved; lemma 5-nerved, mostly acute or awned; stigmas plumose on a very short style; stamens 1-3: fr. free or adherent. (*Festuca*: old Latin name for a grass.)

- Lvs. flat: tall.....1. *F. elatior*  
 Lvs. folded or rolled (at least in drying) and therefore very narrow: culm short or medium.  
 Plant with stolons, not tufted.....2. *F. rubra*  
 Plant not stoloniferous, densely tufted.....3. *F. ovina*

1. *F. elatior*, L. TALL FESCUE. MEADOW FESCUE. Upright strong perennial, sometimes producing short rootstocks: culms glabrous, many-grooved, 2-5 ft., the internodes usually conspicuous above the sheaths: lvs. 1 ft. or so long, ½ in. or less wide, flat, glabrous, somewhat scabrous, the ligule very small: panicle 3-8 in. long, erect or flexuose, usually rather simple, the branches erect or spreading; spikelets about ½ in. long, narrow, green, 5-9-fld., awnless but lemmas sharp. Eu., and widely naturalized in N. Amer.—A prominent meadow- and pasture-grass.

2. *F. rubra*, L. RED FESCUE. Perennial, with short rootstocks: culms few to many, usually reddish at the base, 6-24 or 36 in. high, the lvs. and sheaths smooth: lvs. infolding and narrow, more or less puberulent, shorter than the culms: panicle 2-5 in. long, dark green, reddish or glaucous, at first open but becoming contracted, the branches erect or ascending; spikelets 3-8- or 10-fld.; lemmas indistinctly nerved, with an awn half or less as long. North temp. zone; sometimes grown in meadows.—Var. *heterophylla*, Hack. (*F. heterophylla*, Lam.), has flat culm lvs. and involute basal lvs.; tufted; 2-3 ft.

3. *F. ovina*, L. (*F. vulgaris*, Hort.). SHEEPS FESCUE. Low tufted grass with many sts. and fine lvs., not producing stolons: culms smooth and erect, much overtopping the foliage, 6-18 or 24 in. high: lvs. strongly involute and almost capillary, those on the culm few and short: panicle 2-6 in. long, often 1-sided, green, narrow but open at first and then becoming contracted; spikelets 3-6-fld.; lemmas nerveless or nearly so, short-awned. North temp. zone; used in dry pastures and often found in poor lawns.—The species is widely variable. Var. *duriuscula*, Koch (*F. duriuscula*, L.), HARD FESCUE, has stiff lvs. which are broader than thick. Var. *glauca*, Koch (*F. glauca*, Lam.), BLUE FESCUE, has silvery-glaucous foliage, and is sometimes grown for ornament. Var. *capillata*, Alef. (*F. tenuifolia*, Hort.), has very narrow lvs. and awnless spikelets.

41. *POA*, L. More than 100 species in temp. and cold regions, a few of which are agricultural and lawn grasses; annuals and perennials, of small stature.—Spikelets 2-6-fld., in panicles, the flts. perfect or infrequently dioecious, uppermost flt. imperfect or undeveloped; glumes keeled, 1-3-nerved; lemmas 5-nerved, awnless, a tuft of cobwebby hairs often at the base, mid-nerve usually pubescent; palet 2-toothed, shorter than the lemma, keeled or nerved; stigmas plumose; stamens 3: fr. free or adherent. (*Poa*: Greek grass or fodder.)

- Plant not tufted, the culms few or scattered: panicle small and close ....1. *P. compressa*  
 Plant tufted: panicle open, mostly large.  
 Marginal nerves of lemma pubescent.  
 Intermediate nerves of lemma prominent.....2. *P. pratensis*  
 Intermediate nerves faint.....3. *P. palustris*  
 Marginal nerves glabrous.....4. *P. trivialis*

1. *P. compressa*, L. CANADA BLUE-GRASS. WIRE-GRASS. Low bluish-green perennial, with long creeping rootstocks, not tufted: culm decumbent or geniculate at base, 1-2 ft., flattened, stiff; culm-lvs. short and narrow, glabrous: panicle narrow and small, contracted, 1-3 in. long, erect, the branches very short and in pairs; spikelets 3-9-fld., crowded, often brownish; glumes acute, 3-nerved; lemmas faintly 3-nerved. Eu., Asia.—Extensively naturalized, and used as a pasture-grass; it becomes a persistent weed in tilled hard lands.

2. *P. pratensis*, L. KENTUCKY BLUE-GRASS. JUNE-GRASS. Tufted perennial with slender rootstocks: culms erect, 1-3 ft., nearly or quite terete: lvs. flat, long and narrow, soft, the sheaths compressed, ligule short: panicle pyramidal, 3-8 in. long, the branches fascicled and slender; spikelets 3-5-fld., pedicelled, green; glumes acute, rough-keeled; lemmas 5-nerved, the intermediate nerves prominent and glabrous, the others pubescent below. North temp. zone.—A favorite pasture- and lawn-grass; early flowering.

3. *P. palustris*, L. (*P. serotina*, Ehrh. *P. triflora*, Gilib.). FOWL MEADOW-GRASS. Tufted open-growing perennial, without rootstocks: culms 1-4 or 5 ft., smooth and glabrous: lvs. narrow, flat, sheaths glabrous, ligule medium: panicle loose and open, many-fld., 6-12 in. long, the fascicled branches very slender; spikelets small and numerous, 2-5-fld.; glumes acute, rough on the keel; lemmas obtuse, with obscure middle nerves. North temp. zone.—A meadow-grass.

4. *P. trivialis*, L. ROUGH-STALKED MEADOW-GRASS. Perennial, without rootstocks: distinguished from Nos. 2 and 3 by scabrous sheaths, long ligule ( $\frac{1}{8}$ - $\frac{1}{4}$  in. long), and glabrous marginal nerves of the lemmas: culm slender, often weak, 1-3 ft. Eu.; naturalized, and sometimes sown in meadows.

42. *ERAGROSTIS*, Host. Species more than 100, in temp. and trop. regions, annual and perennial mostly small grasses of little economic importance, a very few grown sparingly for ornament.—Spikelets 2- to many-fld., small, usually somewhat flattened, in diffuse or contracted panicles; rachilla disarticulating above the glumes or sometimes continuous, lemmas deciduous, palea persistent; glumes more or less unequal, shorter than first lemma, acute, 1-3-nerved; lemmas acute, 3-nerved; stigmas plumose; stamens 2 or 3. (*Eragrostis*: Greek combination, probably signifying *love-grass*.)

Spikelets mostly about 5-fld.: plant fragrant.....1. *E. abyssinica*  
Spikelets mostly about 10-fld.: not fragrant.....2. *E. suaveolens*

1. *E. abyssinica*, Link. TEFF. Annual, 2-3 ft., branching and spreading, the culm slender and glabrous: lvs. long and narrow: panicle very loose and open, 10-15 in. long, with long capillary virgate and drooping alternate branches; spikelets mostly about 5-fld. but sometimes 7-9-fld., small, usually not exceeding  $\frac{1}{4}$  in. long, the lemmas acuminate and roughish on the nerves and tip. Afr.—Sometimes grown for ornament; in N. E. Afr., the seeds are used in bread-making.

2. *E. suaveolens*, Becker. Annual, 1-3 ft., with rather soft short lvs., the diffuse panicle comprising half or more the height of the plant: spikelets 7-11-fld., mostly more than  $\frac{1}{4}$  in. long, oblong, the lemmas short-acute and not acuminate. W. Asia.—Grown for bouquets, sometimes under the names *E. amabilis*, *Poa amabilis*, *E. maxima*.

43. *BROMUS*, L. BROME-GRASS. Rather coarse annual, biennial, and perennial grasses, with heavy often awned spikelets, some of the kinds grown for forage and others for ornament; species about 100, mostly in the north temp. zone.—Spikelets several- to many-fld., mostly oblong, commonly diverging or drooping on the slender branches of the open panicle; glumes sharp-pointed, unequal, shorter than the several-nerved lemmas which are mostly 2-toothed and often awned from just beneath the teeth; palea shorter than lemma; stigmas plumose; stamens mostly 3: fr. long and furrowed, adnate to the palea. (Bromus: Greek *food*, applied to the oat.)—There are many weedy species in the genus. *B. secalinus*, L., is the common chess or cheat, formerly supposed by many farmers to come from wheat.

Bromes of agricultural value: spikelets awnless or essentially so.

Plant perennial: lower glume 1-nerved, upper 3-nerved.....1. *B. inermis*

Plant annual: lower glume 3-nerved, upper 5-9-nerved.....2. *B. unioloides*

Bromes grown for ornament: spikelets awned or awnless.

- Spikelets awnless..... 3. *B. brizæformis*  
 Spikelets long-awned.....  
 Lower glume 1-nerved..... 4. *B. madritensis*  
 Lower glume several-nerved..... 5. *B. macrostachys*

1. *B. inermis*, LEYSS. AWNLESS OR HUNGARIAN BROME. Perennial with creeping rootstocks, grown for pastures and meadows, and somewhat escaped, 1 4 ft. high, the culms leafy and glabrous: lvs. flat,  $\frac{1}{4}$ – $\frac{1}{2}$  in. wide, usually somewhat scabrous, length 4–12 in., long-pointed; sheaths closed nearly to the top, ligule short and truncate: panicle 3–6 in. long, the slender branches whorled and ascending; usually several at a node; spikelets 6–10-fld., 1 in. long more or less, narrow, purplish, awnless or the few awns very short and not spreading; lower glume 1-nerved, second glume 3-nerved. Eu.

2. *B. unioides*, HBK. (*B. Schraderi*, Kunth). RESCUE-GRASS. SCHRADERS BROME. Erect annual (or biennial), grown S. for forage: culm 2–3 ft., glabrous: lvs. 3–12 in. long,  $\frac{1}{8}$  in. or less broad, scabrous; sheaths glabrous or pubescent, ligule short: panicle 10 in. or less long, rather narrow, erect, the branches mostly ascending; spikelets 5–10-fld., much flattened, pale green, awnless; lower glume 3–5-nerved, the upper 5–9-nerved. S. Amer.

3. *B. brizæformis*, Fisch. & Mey. QUAKE-GRASS. Annual, grown for the handsome panicle of large drooping Briza-like spikelets, 1–2 ft., erect, glabrous: lvs. 4–8 in. long,  $\frac{1}{4}$  in. or less broad, pubescent; sheaths pubescent, ligule short and truncate: panicle 2–8 in. long, the branches mostly nodding; spikelets few, ovate-oblong and shapely,  $\frac{1}{2}$ –1 in. long, several- to many-fld., awnless, the lemmas inflated; lower glume 3–5-nerved, the second or upper larger and 5–9-nerved. Eu. and Asia; somewhat established in N. Amer.

4. *B. madritensis*, L. Annual, sometimes grown for ornament, 1–2½ ft. high, glabrous: lvs.  $\frac{1}{4}$  in. or less broad, 4–8 in. long, nearly glabrous or pubescent; sheaths glabrous or pubescent, the ligule short and torn: panicle erect, 2–6 in. long, dense, the lower branches spreading in anthesis; spikelets 7–11-fld., puberulent or smooth, the stout awn about  $\frac{3}{4}$  in. long; lower glume 1-nerved, the upper 3-nerved. (Madritensis: of Madrid.) Eu., also escaped.

5. *B. macrostachys*, Desf. Stout annual sometimes grown for its long ornamental spikelets, 1–2 ft., erect, the slender culm glabrous: lvs. narrow, usually less than  $\frac{1}{4}$  in., blade 5–6 in. long, mostly glabrous; sheaths more or less overlapping, close, ligule very short: panicle usually simple, 3–4 in. long, erect; spikelets 1–1½ in. long,  $\frac{1}{8}$  in. broad, compressed, upright, many-fld., with many divergent awns  $\frac{1}{2}$ – $\frac{3}{4}$  in. long; glumes prominently several-nerved. Eu.—Var. *lanuginosa*, Coss. & Dur. has pubescent spikelets and foliage.

44. *BRIZA*, L. QUAKING-GRASS. Species perhaps 20, Old World and S. Amer., annual and perennial, of small stature, some of them grown for the ornamental open panicles.—Spikelets several-fld., perfect, the uppermost small, large and heavy, flattened, more or less tumid, often hanging on capillary pedicels; rachilla disarticulating between the fts.; glumes nearly equal, broad, papery, with rough margins; lemmas papery, cordate, several-nerved, margins rough; stigmas plumose; stamens 3. (Bri-za: old Greek name for a grain.)

Spikelets very large,  $\frac{1}{2}$  in. or more long at maturity..... 1. *B. maxima*

Spikelets small,  $\frac{1}{4}$  in. or less long.

Glumes shorter than lowest fts..... 2. *B. media*

Glumes exceeding lowest fts..... 3. *B. minor*

1. *B. maxima*, L. Annual, 1–2 ft.: lvs. soft, blades 4–6 in. long about  $\frac{1}{4}$  in. broad, glabrous, ligule prominent and obtuse: spikelets ovate, mostly  $\frac{1}{2}$  in. or more long at maturity, pale or bronzy, hanging on slender pedicels, handsome. Eu.

2. *B. media*, L. Perennial, 12–20 in., with narrow lvs.: ligule very short, obtuse or truncate: panicle 3–10 in. long, with slender branches, not much compound; spikelets broad-ovate, about as broad as long, usually purplish; glumes slightly shorter than lowest ft.; lemmas round-oval, not gibbous. Eu.

3. *B. minor*, L. (*B. gracilis*, Hort.). Annual, 6–20 in., with rather broad lvs.: ligule long, lanceolate-acute: panicle broad and compound; spikelets triangular, the well-developed ones usually somewhat longer than broad, green; glumes slightly exceeding the lowest fts.; lemmas round-cordate, gibbous. Eu.

45. *UNIOLA*, L. Nine or 10 N. American erect perennial grasses, of which one is sometimes grown for its handsome panicles.—Spikelets 3- to many-fld.,



flat and 2-edged, the rachilla disarticulating between the flts.; 1-4 lower glumes empty; other flts. perfect or the upper ones staminate; glumes keeled, acute, nerved; lemmas compressed, acute, many-nerved; stigmas plumose; stamens 1-3. (*Uni-ola*; ancient Latin name, diminutive of *unio*, unity; application not evident.)

**U. latifolia**, L. Handsome woodland grass, native from Pa. south and west, sometimes planted in borders: culms slender, erect, 2-5 ft.: lvs. 5-9 in. long,  $\frac{1}{2}$ -1 in. wide, flat, thin, glabrous except on the rough margins, the base often ciliate: panicle 4-10 in. long, open, drooping, with attractive flat green spikelets  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long hanging on thread-like pedicels.

46. **MOLINIA**, Schrank. About 5 species of Eurasian tufted perennial grasses, one sparingly planted for ornament.—Spikelets 2-4-fl., separated along a long axis, rachilla disarticulating above the glumes and extending beyond upper flt. and bearing a rudiment; glumes more or less unequal, 1-nerved, acute, the first lemma somewhat exceeding them; lemmas thin, obtuse or acute, 3-nerved. (*Moli-nia*: J. Molina, Chilean botanist.)

**M. cærulea**, Moench (*Aira cærulea*, L.). Culms erect, simple, 2-5 ft. or more, stiff, glabrous: lvs. rather stiff, 6-12 in. long, narrow, nearly or quite glabrous: panicle 6-18 in. long, with a few erect branches, bearing separated acute awnless green or purplish spikelets. Eu., where it is prized for forage; sparingly adventive in N. Amer.—Sometimes planted for edgings in a form with striped lvs.

47. **DEMAZERIA**, Dumort. (*Brizopyrum*, Link). Four species in Eu. and Afr., annual and perennial, one sometimes grown for ornament.—Spikelets many-fl., flattened, borne separately on a simple axis; lemmas firm, keeled, 3- or 5-nerved, awnless; styles short, stigma plumose; stamens 3. (*Demaze-ria*, later spelled *Desmaze-ria*: J. B. Desmazieres, a French botanist.)

**D. sicula**, Dumort. Annual, about 1 ft. high, with aspect of a *Lolium*, branching, decumbent or geniculate at base: lvs. 3-6 in. long, narrow, thin, glabrous, the papery ligule prominent: flat awnless spikelets about  $\frac{1}{2}$  in. long, about 12 of them alternate and sessile in a distichous spike. *Medit. region.*

48. **DACTYLIS**, L. A single species of the temp. parts of the Old World, grown widely as a hay and forage grass, and extensively naturalized in N. Amer.—Spikelets 2-5-fl., in compact 1-sided bunches or glomerules, these collected in an open divaricately branched panicle that contracts after flowering; glumes hispid on the keel, unequal, sharp-pointed; lemma nerved, short-awned, exceeding the palet; stigmas plumose, on distinct styles; stamens 3: fr. free, inclosed in lemma and palet. (*Dac-tylis*: Greek name referring to dactyls or fingers, originally applied to some other grass.)

**D. glomerata**, L. ORCHARD-GRASS. COCKS-FOOT. Stout perennial, 2-4 ft., forming tussocks: culm glabrous, angled, simple: lvs. many, flat,  $\frac{1}{4}$ - $\frac{1}{2}$  in. wide, scabrous; sheaths long, ligule thin and prominent: panicle 3-8 in. long, the branches few and in anthesis wide-spreading or even declined.—Var. *variegata*, sometimes planted for ornament, has lvs. silvery-striped.

49. **LAMARCKIA**, Moench (*Achyrodes*, Bochn.). One species, an annual of S. Eu. and naturalized in Calif., cult. for ornament.—Spikelets in raceme-like fascicles, which are aggregated into a second panicle, terminal one in each fascicle fertile and the others sterile; fertile spikelet of 1 perfect long-awned flt. and a sterile short-awned lemma; glumes 1-nerved, acuminate or short-awned; sterile spikelets with acuminate glumes and blunt lemmas. (*Lamarck-ia*: J. B. Lamarck, 1744-1829, French naturalist and philosopher.)

**L. aurea**, Moench (*Chrysurus cynosuroides*, Pers.). GOLDEN-TOP. Tufted branching soft-leaved grass about 1 ft. high: lvs. many, flat, glabrous, with inflated sheaths, ligule papery, long and prominent: panicle rather dense, 1-3 in. long, glossy, golden-yellow sometimes shading to violet; fascicles squarrose or drooping, with tuft of hairs at base.



50. **CYNOSURUS**, L. Half-dozen or fewer perennials and annuals of the Old World, one an agricultural grass of minor importance.—Small grasses, tufted: clusters of spikelets sessile and continuous, forming a spike-like infl., each cluster consisting of a sterile and a perfect spikelet; lower (outer) spikelet in the cluster comprised of sterile lemmas, the upper (inner) one of fertile flts.; styles short; stamens 3. (*Cynosu-rus*: Greek *dog's tail*.)

**C. cristatus**, L. **CRESTED DOGS-TAIL**. Low perennial, sometimes sown in meadow-grass mixtures: culms slender, glabrous, 1-2½ ft.: lvs. numerous from the crown, soft, smooth, narrow and flat, shorter than the culms, the culm-lvs. mostly few and short, the long sheaths and hyaline ligule prominent: spike terminal, 1-3 to 4 in. long, more or less distichous, the clusters of spikelets at first separated; sterile outer spikelet in the cluster larger with narrow awn-pointed empty alternating lemmas ciliate on the margins, giving the spike a crested appearance. Eu., adventive in N. Amer.

51. **CORTADERIA**, Stapf. Five species of large perennial grasses in S. Amer., forming large clumps, one of which is commonly planted in Calif. and elsewhere.—Plants diœcious; spikelets 3-7-flid., with glabrous rachilla which disarticulates above the very narrow thin 1-nerved glumes; lemmas acuminate, 3-nerved and awnless, in the staminate flts. glabrous or nearly so, in the pistillate very hairy toward the base; palea much shorter than the lemmas, 2-keeled; stamens 3, reduced to staminodes in the pistillate flts.; stigmas slender, plumose: fr. narrow-oblong, free. (*Cortade-ria*: from the S. American name.)

**C. argentea**, Stapf (*Gynerium argenteum*, Nees). **PAMPAS-GRASS**. Perennial in leafy clumps, with culms 4-10 or 20 ft. high overtopping the foliage: lvs. long and narrow, rough-margined, with tufted hairs at the throat of the sheath: pistillate panicles white or pink, 1-3 ft. long, silky-hairy, plummy and fluffy; staminate panicles with naked spikelets; spikelets 2-3-flid., with slender-awned lemmas. Argentina.—**C. Quila**, Stapf, more tender, with lavender-colored plumes and biennial culms from a perennial root, is sometimes cult., Chile.

52. **ARUNDO**, L. A half-dozen giant perennial reeds, from the tropics and subtropics of the Old World, one frequently planted for its bold habit and showy terminal panicles.—Spikelets 2- to several-flid., the upper flts. smaller, disarticulating above the glumes, the rachilla glabrous; glumes more or less equal, narrow and 3-nerved, about the length of the spikelet; lemmas 3-nerved, densely long-hairy, the mid-nerve running into a straight awn; stigmas plumose; stamens 3. (*Arun-do*, *Don-ax*: ancient Latin names, from the Greek for reed.)

**A. Donax**, L. **GIANT REED**. Culms very strong, somewhat woody, 6-20 ft. tall, from horizontal knotty rootstocks: lf.-blades 1-2 ft. long, flat, 1-3 in. broad, glabrous except on edges, regularly distichously spaced along the culm, auriculate at base, the throat of the sheath with a hairy tuft: panicle erect, 1-2 ft. long, rather narrow with many slender ascending branches; spikelets numerous and crowded, ½ in. long, pointed, in anthesis displaying the copious hairs. Medit. region, and escaped far S. and in the tropics.—Seldom blooms in the northern parts. Var. **versicolor**, Kunth, has lvs. striped with white or yellowish; auricles often dark brown.

## 17. CYPERACEÆ. SEDGE FAMILY

Many sedgy commonly perennial plants around the globe, distinguished from grasses by the mostly 3-angled and solid culms, 3-ranked lvs., closed rather than open or split lf.-sheaths, and very different fls. which are commonly aggregated into spikes or heads and not usually in open panicles; the genera and species are many, but very few kinds are in cult. and these mostly for ornament in foliage.—Fls. small and green, inconspicuous, bisexual or unisexual, monœcious or diœcious, borne in spikelets and covered by subtending bracts; perianth none, or represented by scales or bristles; stamens 2 or 3;

ovary 1-celled, naked or contained in a closed sac, the styles 2 or 3 and the achene lenticular or trigonous.

Pistil not inclosed, surrounded by scales or bristles.

- |   |            |
|---|------------|
| Spikelets flattened, the scales being 2-ranked and keeled.....              | 1. CYPERUS |
| Spikelets globular or cylindrical, the scales imbricated on all sides ..... | 2. SCIRPUS |
| Pistil in a closed sac or perigynium.....                                   | 3. CAREX   |

1. **CYPERUS**, L. **GALINGALE**. About 600 widely distributed species, bearing the spikes mostly in umbel-like clusters subtended by involucre-like lvs.; two are well known in conservatories.—Fls. bisexual, in flattened spikelets under 2-ranked keeled scales; stamens 1-3; pistil 1, the style 2-3-cleft, and the achene lenticular or trigonous; perianth none. (Cype-rus: ancient Greek name for these plants:)

Rays of umbel very many, long-filiform; plant 5 ft. and more tall ..... 1. *C. Papyrus*

Rays few to many, short; plant 4 ft. or less tall.

Spikelets globular or oblong.

Culm-lvs. reduced to sheaths..... 2. *C. alternifolius*

Culm-lvs. well developed..... 3. *C. adenophorus*

Spikelets linear,  $\frac{3}{8}$ -1 in. long, sessile, spreading from the rachis ..... 4. *C. esculentus*

1. **C. Papyrus**, L. (*Papyrus antiquorum*, Willd.). **PAPYRUS**. Plant caespitose; culms strong and erect, 5-8 ft. and more, smooth, obtusely 3-angled, the lvs. reduced to short-pointed sheaths near the thick spongy base: umbel terminal, large, comprising 50-100 and more drooping filiform rays 10-20 in. long and much exceeding the few small involucre lvs.; involucels of several long slender lvs. or bracts; spikelets linear, sessile, squarrose, pale chestnut, the rachis winged. S. Eu., Syria, Afr.—The paper plant (*Papyrus*) of the Egyptians, often grown in aquaria and ponds for its striking effect.

2. **C. alternifolius**, L. **UMBRELLA PLANT**. Caespitose, from tough matted roots, 2-4 ft.; culms stout, erect, angled and striate, clothed below with leafless brown sheaths: umbel terminal in an involucre of many long firm spreading lvs. that give the plant its umbrella effect, the primary rays 1-2 in. long, secondary rays few or none; spikelets oblong to short-oblong (about  $\frac{1}{2}$  in. or less), flattened, 6-12-fl. on either side, mostly sessile in bunches at the end of the primary rays. Afr., naturalized in W. Indies and S. Amer.—A common pot and porch plant. Var. *variegata*, Hort., has white-lined culm and lvs. Var. *gracilis*, Hort., is a foot or so high with more erect involucre lvs. which are 1-3 in. long.

3. **C. adenophorus**, Schrad. Culm about 2 ft. high, angled, leafy below: umbels terminal, diffuse, bearing many globular or ovoid to lanceolate small spikelets on slender secondary and tertiary rays (spikelets all stalked), the involucre lvs. many and ascending: achene obovate, 3-angled. Brazil.—Sometimes grown in pots, not very common.

4. **C. esculentus**, L. **CHUFA**. Rather stout leafy plant to 3 ft. high, bearing oblong underground edible tubers (chufas): umbel large, terminal, with long broad involucre lvs., some of the rays much longer than others; spikelets numerous, linear, 1 in. or less long, sessile and squarrose on the rachis forming a short straw-colored spike: achene oblong, obtuse, 3-angled. Native in N. Amer., Eu., Asia, and sometimes a weed.

2. **SCIRPUS**, L. **BULRUSH**. Species about 150 in many parts of the world, the plants various, sometimes hair-like and without lf.-bearing culms and sometimes tall, stout and leafy; one little species is prevalent in greenhouses and a stouter one is sometimes grown about ponds.—Fls. bisexual, in heads or in spikelets that are variously umbelled; perianth sometimes absent but usually represented by 1-6 or 8 bristles; stamens 2 or 3; pistil 1, with a 2-3-cleft style: achene lenticular or trigonous. (Scir-pus: the classical Latin name.)

Plant of many filiform culms and single terminal head or spike ..... 1. *S. cernuus*

Plant of fewer stiff tall culms, and clustered spikes..... 2. *S. Tabernaemontani*

1. **S. cernuus**, Vahl (*S. gracilis*, Koch. *Isolepis gracilis*, Hort.). Small tufted plant with numerous filiform culms 6-12 in. long, erect at first but becoming weak or drooping: lf.-blades short or none from the basal sheaths: spikelet small and terminal, usually  $\frac{1}{4}$  in. or less long (in the wild in Eu. reported sometimes 1 in. long), ovoid to oblong-lanceolate, subtended by a bract usually less than its own length; scales obtuse, thin; styles 3. Eu., and elsewhere.—Frequent in pots and as edging in greenhouses.

2. *S. Tabernæmontani*, Gmel. Culms stiff and erect, terete, glaucous, 2 ft. or more high, with 1 or 2 long leaf-pointed sheaths at base: spikelets ovoid, in a small terminal more or less drooping cyme subtended by a bract usually shorter than the developed cluster; scales fringed, mucronate; styles 2, the achene lenticular or compressed and short-oblong, convex on one side. (*Tabernæmontani*: Latinized name of a German pre-Linnaean botanist, J. T. *Tabernæmontanus*.) Eu., shores and ponds.—Cult. in var. *zebrinus*, Nichols. (*Juncus zebrinus*, Hort.), marked on the culm by alternate broad bands of green and white. The American representative of *S. Tabernæmontani* is *S. validus*, Vahl, native on the margins of ponds.

3. **CAREX**, L. **SEDGE**. Probably 800 to 900 known species of grassy plants, perennial, mostly outside the tropics, of the widest distribution, usually of wet lands but many of them of uplands; very few are cult., although many of them bear ornamental spikes.—Fls. always unisexual, mostly separated on the same plant (monœcious) but sometimes diœcious, the staminate fls. in a separate terminal spike or at the base of a spike bearing pistils (spike androgynous); perianth none; stamens 3, under a scale; pistil 1, inclosed in a sac or perigynium which is subtended by a scale; spikes erect or drooping, in the axils of lvs. or bracts, mostly at or near the top of the culm. (Ca-rex: classical Latin name.)

Lvs. flat, about  $\frac{1}{4}$  in. wide, often striped.....1. *C. Morrowii*  
Lvs. filiform.....2. *C. comans*

1. *C. Morrowii*, Boott (*C. japonica*, Hort.). Tufted, the bright green flat lvs. evergreen, long-pointed, in the cult. form usually white-striped: culms nearly as long as the lvs., 12 in. or so, bearing a long-stalked terminal spike and 3 or 4 stalked pistillate spikes from sheaths: perigynium long-beaked, strongly few-ribbed, 2-toothed, about the length of the sharp-pointed scale; styles 3. Japan, where it was first collected by Dr. James Morrow, attached to Commodore Perry's Expedition to the China Sea and Japan.—A good pot and border-plant; sometimes seen in greenhouses.

2. *C. comans*, Bergg. (*C. Vilmorini*, Mott.). Densely tufted pale green or reddish plant with many very narrow (filiform) lvs., used for grass-like edgings: culms shorter or longer than the lvs., slender, 12–18 in. long: terminal spikelet (or 2 of them) staminate, slender, sessile or short-stalked; lateral spikes 3–5, 1 in. or less long, scattered, short-stalked, pistillate: perigynium broad, rather short-beaked, more or less ribbed on the back, 2-toothed, equaling or exceeding the awned scale; styles 3. New Zeal.

## 18. PALMACEÆ. PALM FAMILY

Noble plants of characteristic appearance yet of widely variable form, most of them trees of diverse dimensions, some of them erect shrubs, others climbers, all with woody rather than herbaceous sts. usually not branched, and stiff evergreen lvs. mostly forming a crown at top of plant; genera upward of 140, and species probably more than 1,200, many of which are yet imperfectly understood; inhabitants of tropics around the world, extending into warm-temp. regions. Many kinds are planted in the warmer parts of the U. S., but the botany of some of them is obscure. In the juvenile stage, several species are common in conservatories and are much used for decoration; as these plants are not seen in fl. and fr. and the trunk may not develop, the observer may have difficulty in determining them. The palmetto of the southern states (*Sabal Palmetto*, Lodd.) is sometimes transferred to grounds, as well as other smaller native species.—Fls. small or minute, mostly greenish and individually inconspicuous, unisexual or bisexual, usually many in conspicuous simple or much-branched spadices among the lvs. or below them or sometimes above them; a spathe commonly present and covering the bud and often becoming woody; perianth usually of 6 parts or lobes, representing 3 sepals and 3 petals; stamens mostly 6, but sometimes more; pistil 1 and 3-celled, or sometimes the 3 carpels separate, ovule 1 in each cell or carpel: fr. mostly 1-seeded by abortion

of the other 2 ovules, a berry, drupe, or nut, in many sizes and forms: lvs. usually very large, palmate or pinnate, rarely entire or nearly so at maturity, plicate, entire in the bud, mostly on long petioles which are commonly imbricated at the base: veneration (unfolding of lvs. from the bud) of two main types—induplicate when the faces or upper surfaces of the plaits are folded together, and reduplicate when the backs of the plaits lie against each other: growth of the caudex from a single terminal bud, but a few of the species branch as they grow. As planted and greenhouse palms are known mostly in their foliage state, the following key is necessarily constructed on the most evident lf. characters, a method, however, that has decided limitations.

- A. The fan-palms—lvs. palmate, circular in outline.
  - B. Division of lvs. nearly or quite to the base; segms. not long-tapering. . . . . 1. RHAPIS
  - BB. Division less than to the base, so that the blade bears a solid plaited body or disk; segms. taper-pointed.
    - c. Petiole not spiny or saw-toothed; blade not deeply cut. . . . . 2. PRITCHARDIA
    - cc. Petiole spiny, at least toward the base (spines sometimes disappearing in old tree-like plants); blade cut one-third or more its depth.
      - D. Spines curved and hard, erect or retrorse, often at base of petiole only.
        - E. Plants not pot subjects, with shaggy trunk: lvs. in the usual species bearing many long filaments or threads. . . . . 3. WASHINGTONIA
        - EE. Plants commonly grown in pots or tubs in greenhouses: lvs. destitute of filaments or bearing only 1 to a segm. . . . . 4. LIVISTONA
        - DD. Spines mostly straight, all along the petiole. . . . . 5. CHAMÆROPS
        - ccc. Petiole irregularly sharp-serrate (saw-edged), mostly throughout its length. . . . . 6. TRACHYCARPUS
      - AA. The feather-palms—lvs. pinnate, long.
        - B. Pinnæ (segms.) short, broadening toward the top. . . . . 7. CARYOTA
        - BB. Pinnæ long and narrow, taper-pointed.
          - c. Lf.-segms. reduplicate in veneration.
            - D. Petiole slender and smooth, rounded on back, flattened or concave or rounded on top (sometimes thin-edged at base), the rachis not showing right angles in cross-section.
              - E. Rachis and petiole yellow, at least on young plants: plant producing many small trunks in a clump. . . . . 8. CHRYSALIDOCARPUS
              - EE. Rachis and petiole not yellow: trunks single. . . . . 9. HOWEA
            - DD. Petiole stout and heavy or becoming so (exception in slender species of *Syagrus*), the rachis markedly angled and ridged, or sometimes becoming concave above, expanding at base and flat and sharp-edged: includes large trees.
              - E. Segms. or pinnæ with inconspicuous slight veins between midrib and margin, the keel strongly ridged and prominent.
                - F. Grown for the very large edible frs. (coconut). . . . . 10. COCOS
                - FF. Grown for ornament: frs. 1 in. or less diam.
                  - g. Pinnæ 1 in. or so broad: good-sized tree, planted in streets and parks. . . . . 11. ARECASTRUM
                  - gg. Pinnæ much narrower: ours a shrub or little tree, mostly for pot and tub decoration. . . . . 12. SYAGRUS
                - EE. Segms. or pinnæ with very strong veins or riblets between the midrib and margin, the keel itself not strongly ribbed: stout trees.
                  - F. Bole with a marked bulge or enlargement at its base or higher up: infl. of upright branches. . . . . 13. ROYSTONIA
                  - FF. Bole without such marked swelling: infl. of hanging branches. . . . . 14. ARCHONTOPHENIX (Loroma)
          - cc. Lf.-segms. induplicate in veneration. . . . . 15. PHENIX

1. RHAPIS, L. f. Five species of small palms with many reed-like sts., E. Asia, one a common tub-plant in greenhouses.—Fls. mostly diœcious, in short branching bracteate clusters among the foliage; calyx and corolla 3-toothed; stamens 6, represented by 6 staminodia in the fertile fls.; carpels 3 and distinct, making 1-3 small 1-seeded berries: sts. encased in network sheath: lvs. slender-petioled, palmately parted nearly or quite to the base, strongly parallel-ribbed, remaining broad at the end: veneration induplicate. (Rha-pis: Greek *needle*; application not obvious.)



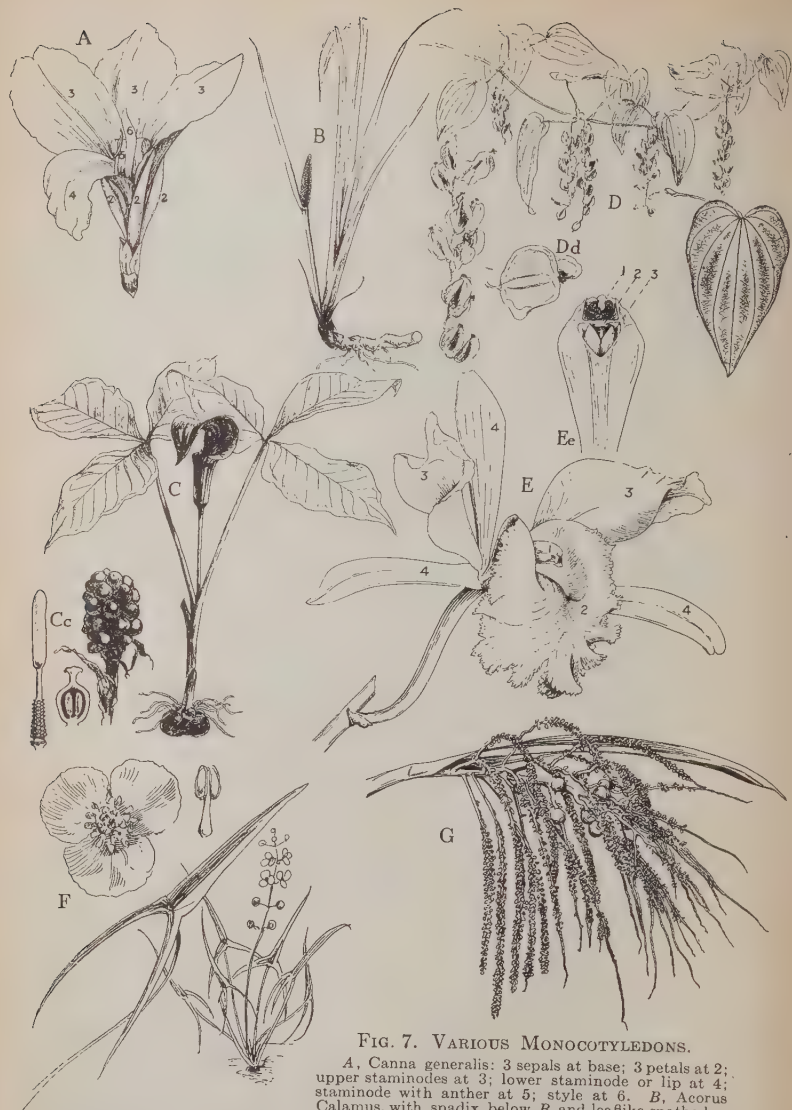


FIG. 7. VARIOUS MONOCOTYLEDONS.

or hooded spathe; *Cc*, spadix at left with sterile club-shaped extension, cluster of ripened pistils at right, ovary in section beneath. *D*, *Dioscorea* with hanging fruit-clusters; *Dd*, separated winged fruit. *E*, *Cattleya*; 1, gynandrium; 2, lip (one of the petals); 3, 3, other petals; 4, 4, 4, sepals. *Ee*, gynandrium or column; 1, anther; 2, rostellum, representing a third stigma; 3, the 2 stigmas. *F*, *Sagittaria*, or arrowhead. *G*, Inflorescence of coconut, showing spathe above and the spadix with many drooping branches; these branches bear a few large pistillate flowers at base, the remaining flowers being staminate.



**R. flabelliformis**, Ait. Cespitose, making a dense mass of foliage a few ft. high: petiole flattened, more or less rough on the edges, fibrillose at base; blade 5-10-parted nearly to the base, the segms. spreading, reticulate between the strong veins, finely serrate, the apex short-toothed. China, Japan.

2. **PRITCHARDIA**, Seem. & Wendl. (*Styloma*, O. F. Cook). About a half-dozen species in the Pacific Isls., of comely erect spineless fan-palms, of which one is frequently planted far S. and is sometimes seen under glass.—Fls. bisexual, in branching mostly short clusters among the lvs. but which are very long-peduncled in some species, hanging in fr., the spathe prominent but bract-like; calyx and corolla each shallowly 3-lobed, the tube persistent; stamens 6; ovary 3-angled or 3-lobed, style long and sulcate and terminal on the ovary: fr. a small globular or ellipsoid hard berry supported on the hardened perianth-tube, 1-seeded, the prominent but short style terminal: lvs. large, not deeply cut, many-plicate, often bearing a few thread-like filaments: veneration induplicate: trunk mostly smooth and ringed, often somewhat shaggy toward the top. (Pritchardia: W. T. Pritchard, British consul and author in Polynesian subjects.)

**P. pacifica**, Seem. & Wendl. Bole straight, to 30 ft.: lvs. nearly circular, 3-5 ft. across, prominently plicate, tomentose when young, divided about one-third their depth into attenuate bifid segms. and bearing a few filaments; petiole thin, concave above, more or less fibrillose: frs. globular,  $\frac{3}{8}$ - $\frac{1}{2}$  in. diam. Samoa, Fiji.

3. **WASHINGTONIA**, Wendl. (*Neowashingtonia*, Sudw.). Three stout and mostly massive palms of S. Calif. and adjacent Ariz. and Mex., by some authors included in Pritchardia, one or two extensively planted in Calif. and also eastward on the Gulf region.—Fls. bisexual, white, in long panicle spadicis among the foliage, the spathes long and thin; perianth toothed; stamens 6; ovary 3-lobed: fr. a small ellipsoid black drupe with stigma basal: lvs. large and plicate, cut nearly to the middle, often bearing copious filaments: veneration induplicate: trunk becoming smooth and ringed below, but upward bearing an immense shaggy mane of remains of lvs. (Washingtonia: George Washington.)

Lvs. bearing many thread-like filaments.....1. *W. filifera*  
Lvs. bearing few or no filaments.....2. *W. gracilis*

1. **W. filifera**, Wendl. Stout tree, 20-40 ft.: petioles 2-5 ft. long, armed to middle or somewhat farther, plano-convex, prolonged into the blade with an acute point; blade of lf. 3-5 ft. across, gray-green, cleft nearly to the middle, bearing many long filaments: seed flattened on the raphal face.—Var. **robusta**, Parish, the form of the species planted in this country, is a stouter taller tree: petioles armed throughout, longer, concave on upper surface; blade cleft two-thirds to the base: seed excavated on raphal face. **W. Sonoræ**, S. Wats., from Mex. (Sonora), is a smaller palm with somewhat glaucous very filiferous lvs.: petiole very slender, obtuse at the apex where it joins the blade.

2. **W. gracilis**, Parish. Trunk slender, to 80 ft., the lvs. nearly or quite destitute of filaments: petiole with yellow-hooked spines, rather convex on upper surface; blade cleft little more than one-third to base: seed somewhat wrinkled on raphal base.—Planted under the name *W. robusta*; probably native in Mex.

4. **LIVISTONA**, R. Br. A dozen or more species, comprising the most common fan-palms of greenhouses and decorative use; native in E. Asia and Malaya to Australia.—Fls. bisexual, small and greenish, borne in elongated branching spadicis among the lvs., mostly drooping in fr., the spathes many and sheathing the peduncle; calyx and corolla 3-lobed nearly or quite to the base; stamens 6; ovary 3-celled, the style short: fr. globose to oblong-ellipsoidal, small, smooth, the seed erect: lvs. strongly plicate, with many long bifid segms.; petiole plano- or concavo-convex, spiny the whole length on the edges or only toward the base, becoming spineless in old plants: veneration

induplicate: trunk short or tall, becoming ringed, bearing toward the top more or less dead lf.-sheaths and brown articulated fiber, in greenhouses usually not evident. (*Livisto-na*: in honor of P. Murray of Livistone near Edinburgh.)

- Lf.-segms. hanging at the end, particularly on old plants. .... 1. *L. chinensis*  
Lf.-segms. horizontal or only declined. .... 2. *L. rotundifolia*

1. *L. chinensis*, R. Br. CHINESE FAN-PALM. The common tub fan-palm for decoration, producing a short caudex bearing the bases of the removed petioles and the fibrous tissue, but in nature making a ringed trunk 50 ft. high: lvs. 3-5 ft. across, broader than long, cut to about the middle, the long bifid segms. bending sharply downward with age; petiole plano-convex, spiny on the lower part, in the young plants common in cult. in U. S.: fr. ellipsoid-oblong,  $\frac{3}{4}$ -1 in. long, black, olive-like. China.—In cult. it often erroneously bears the name *Latania borbonica*. Mature trees in the open produce a graceful fountain-like effect with the slender pendent lf.-lobes.

2. *L. rotundifolia*, Mart. (*L. altissima*, Zoll.). Slender tall palm to 50 ft.: lvs. large, circular in outline, 3-5 ft. across, with 60-90 long-acuminate bifid segms.; petioles of adult plant spiny at the base but elsewhere unarmed: spadix 3-5 ft. long, of 3 main parts that are free from their bases and arising from one flattened spathe: fr.  $\frac{1}{2}$  in. or less diam., spherical, dark violet drying black. Java.

5. *CHAMÆROPS*, L. Two small fan-palms in the Medit. region, one of which is frequently used as a hardy planted palm and is often seen in greenhouses.—Fls. dicecious or polygamo-dicecious, in short erect densely fld. spadices among the lvs., spathes 2-4, the lower ones split; calyx 3-parted; petals 3, free; stamens 6-9; ovaries 3 or rarely more, the stigma nearly sessile: fr. ovoid or nearly globular, becoming reddish or yellowish, small: lvs. deeply cut, with narrow spreading segms., petiole slender and usually spiny: plant commonly branching near the base, producing several clustered trunks: veneration induplicate. (*Chamæ-rops*: Greek *dwarf bush*.)

*C. humilis*, L. EUROPEAN FAN-PALM. Main trunk usually 1-3 ft., branching and suckering from the bottom, but plant in the open reaching 15-30 ft.: lvs. glaucous above and beneath, cut one-third to two-thirds into narrow spreading not drooping segms. which are entire or bifid at apex; petiole slender, long, usually with straight spines along the margins.—There are variations under several hort. names.

6. *TRACHYCARPUS*, Wendl. Four species of small or medium fan-palms, the trunks single or cespitose, one planted on the colder limits of palm climates.—Fls. small, becoming yellow, monœcious or polygamous, in branching spadices among the foliage, the spathes many and prominent; calyx and corolla 3-parted; stamens 6; ovaries 3, joined at the base: fr. globose, oblong or somewhat reniform, the stigma terminal: lvs. many-plicate, with long bifid segms.; petiole convex both sides or plano-convex, mostly serrate along the margins, at the base involved in fibers: veneration induplicate: trunk spineless. (*Trachycarpus*: Greek *rough fruit*.)

*T. excelsa*, Wendl. (*Chamærops excelsa*, Thunb.). Tree 10-25 ft., with stout trunk clothed with old lf.-sheaths: lvs. many, at top of trunk, nearly or quite orbicular, 2-4 or more ft. across, dull and somewhat glaucous, divided to about the middle, the segms. stiff and not drooping; petiole serrate with callous points: fr. 3-lobed and dry, 1 or more of the lobes sometimes suppressed by abortion, small. Japan.—Var. *Fortunei*, Makino (*Chamærops Fortunei*, Hook.), from China, is mostly more robust, petiole shorter and stouter, lvs. shining and less glaucous, divided much below the middle, the segms. broader and the tips pendulous. (Robert Fortune, page 447.)

7. *CARYOTA*, L. FISH-TAIL PALMS. Ten to 12 palms producing tall trunks or several soboles (suckers), with bipinnate lvs. bearing fan-shaped or deltate segms.; trop. Asia to Australia.—Fls. mostly monœcious, in separate interfoliar spadices with long hanging branches, spathes few or several; perianth somewhat unlike in the sterile and fertile fls., the 6 parts separate or at base

somewhat connate, the petals in the sterile fls. much elongated; stamens many to very numerous; ovary 3-celled, with erect ovules: fr. globose or short-oblong,  $\frac{1}{2}$  in. or somewhat more diam., becoming purplish: lvs. horizontal, with drooping graceful spray: vernation reduplicate: trunks spineless, erect. (Caryo-ta: Greek name first applied to the cult. date.)

Segms. (ultimate pinnæ) light green, thin, not stoutly ribbed, with a short point or acumen.....1. *C. mitis*  
 Segms. dark green, stiff, stoutly ribbed, with a long point or cauda.....2. *C. urens*

1. *C. mitis*, Lour. (*C. sobolifera*, Wall.). Low tree to 25 ft., finally suckering freely: lvs. 4-9 ft. long, light green; segms. rather thin and flexible, with many rather light ribs, the terminal ones variously irregularly lobed at the apex, the lateral ones nearly truncate to truncate-oblique, the toothed edge usually not covering more than half the length of the blade and the outer margin produced into a short point: spathe and spadix scurfy (as are petioles and lf.-sheaths), the spadix much smaller than in No. 2; staminate fls. about  $\frac{1}{4}$  in. long, the stamens 15-25: fr.  $\frac{1}{2}$  in. diam., bluish-black, the seed globose. Trop. Asia and Malaya.—Frequent in green-houses.

2. *C. urens*, L. WINE PALM. Much taller, to 75 ft. and more, ringed, not soboliferous: lvs. large and stout, 12-20 ft. long, dark green; segms. thick and stiff, strongly ribbed and fish-tail-like, terminal ones jagged or irregularly lobed at top, lateral ones long-oblique so that the coarsely toothed edge usually covers more than half the length and the outer margin commonly produced into a long part like an index finger: spathe and spadix not scurfy, the spadix to 10 or 12 ft. long, hanging; staminate fls.  $\frac{1}{2}$  in. or more long, one on either side in fertile fl., the stamens 40 or more: fr. to  $\frac{3}{4}$  in. diam., reddish. Trop. Asia and Malaya.

8. *CHRYSALIDOCARPUS*, Wendl. One feather-palm from Madagascar, frequent as a florist's pot subject and often planted in the American tropics.—Fls. monœcious, in short spadices among or near the foliage, the sterile with recurving branches; sepals and petals 6; stamens 6, the short broad anthers dorsified; ovary 1, with short style and broad stigma: fr. somewhat turbinate, violet or nearly black: lvs. smooth and slender, with many narrow pinnæ, the petiole and rachis grooved above: vernation reduplicate: trunk spineless. (*Chrysalidocar-pus*: Greek *golden fruit*.)

*C. lutescens*, Wendl. (*Areca lutescens*, Bory. *Hyophorbe indica*, Gaertn.). Branching at the crown, making a clump of smooth erect-spreading bamboo-like caudices, 10-25 ft. tall: lvs. gracefully spreading, light green and with yellow smooth petiole and rachis, the pinnæ somewhat arching,  $\frac{1}{2}$ - $\frac{3}{4}$  in. wide, the very long slender points short-bifid, usually with one prominent vein midway the midrib and margin.

9. *HOWEA*, Becc. Two erect feather-palms, extensively grown for florist's use and decoration usually under the name of *Kentia*; from Lord Howe's Isl., S. Pacific, whence the name *Howea*.—Fls. monœcious, sunken in simple large spadices among the foliage; perianth of 3 broad sepals and 3 broad petals; stamens 30-40, clustered, sessile or nearly so; ovary 1, with 3 stigmas: fr. ovoid or olive-shaped, smooth, like a large pecan, containing 1 large seed: lvs. erect-spreading, smooth, of many graceful pinnæ with long-pointed bifid hanging ends: vernation reduplicate.

Pinnæ arching away from the rachis.....1. *H. Belmoreana*  
 Pinnæ standing away from the rachis, nearly horizontally.....2. *H. Forsteriana*

1. *H. Belmoreana*, Becc. (*Kentia Belmoreana*, F. Muell.). Smooth-trunked tree to 35 ft.: lvs. 5-8 ft. long, gracefully curving; pinnæ long and narrow, strongly rising and arching from the rachis, then pendent. (Dedicated to De Belmore, Governor of New S. Wales.)

2. *H. Forsteriana*, Becc. (*Kentia Forsteriana*, F. Muell.). As a pot plant, less compact than No. 1, less leafy: pinnæ mostly fewer, spreading nearly horizontally from the rachis for the first third or half their length and then pendent, giving the lf. a flat appearance. (Bears the name of Wm. Forster, Senator, New S. Wales.)

10. **COCOS**, L. The genus comprises the coconut; also as generally understood, about 30 other feather-palms in trop. Amer., one of which is common as a pot plant in its juvenile state and others, more or less botanically confused, are planted in Fla. and Calif.; but botanists now prefer to divide the genus into 8 or 9, reserving *Cocos* for the coconut alone, as here intended.—Fls. monœcious, the two sexes in the same spadix, the fertile few near the base of the infl. and very large and globose; perianth of 6 parts, differing in sterile and fertile fls. but sepals and petals all concave-hooded and strongly convolute-imbricated; stamens 6; ovary single, 3-celled: fr. very large, ovoid to elliptic-conical, 1-seeded, the nut mostly with 3 scars at the germinating end and inclosed in a tight fibrous husk: lvs. pinnate, the pinnæ long and slender and more or less bifid, petiole smooth or spiny: vernation reduplicate: trunk at first erect but becoming oblique at base, spineless: spadices among the lvs., the spathe merely striate not plicate or sulcate. (Co-cos: Portuguese *monkey*, alluding to the face in the coconut.)

*C. nucifera*, L. COCONUT. Trunk slender, becoming 100 ft. high in favorable conditions, often crooked, erect from an inclined base, bearing a crown of lvs. of which the lower ones are pendent: lvs. 10–20 ft. long, smooth; pinnæ 2–3 ft. long, with a very strong keel, folded backward, the intermediate veins inconspicuous: panicles (spadices) borne among the foliage, bearing great numbers of staminate fls. and a few large pistillate fls. near the base of the branches: spathe single, boat-shaped: frs. few from each spadix, 8–12 in. long, 3-faced, bearing one great globular-oblong seed (coconut) inside the thick fibrous husk with 3 micropyles or scars from one of which the single embryo germinated; endosperm partly solidified, forming the “meat,” and partly unsolidified forming the “milk” in the coconut. Usually ascribed to Asia, but possibly native to trop. Amer.—A characteristic tree of trop. shores; there are several botanical vars.

11. **ARECASTRUM**, Becc. Differs from *Cocos*, with which the species has been united, by the upper spathe being externally strongly grooved (plicate-sulcate), the pistillate fls. ovate or ovate-conical (not globose as in *Cocos*), the sepals acute or more or less hooded, the petals valvate at apex; ovary densely papillose-pilose: fr. small, 1-seeded by abortion, the nut inclosed in a thin fibrous casing and its wall thick and bony, the scars deep; sterile cell a narrow vestige in the bony wall; seed very irregular in shape, strongly curved or hooked. Species 1, with straight annular trunk. (*Arecastrum*: *Areca-like*, *Areca* being a genus of palms.)

*A. Romanzoffianum*, Becc. (*Cocos Romanzoffiana*, Chamisso. *Cocos plumosa*, Hook.). Straight erect tree to 30–60 ft., the bole slender, smooth and ringed at wide intervals, bearing remains of dead petioles near the top: lvs. 10–15 ft. long, erect-spreading and the ends recurving, the petiole very long; pinnæ mostly 2–4 near together on the rachis but sometimes solitary, 12–18 in. long, drooping near the end: panicle (spadix) among the lvs., much branched, 3 ft. long, with drooping branches: fr. ovoid, 1 in. or more long, orange. Brazil; known in many vars.; commonly planted in S. Calif., S. Fla., and elsewhere; bears the name of a Russian nobleman, patron of science.

12. **SYAGRUS**, Mart. Differs from *Arecastrum* in technical characters of fr.: nut prominently 3-striped, the sterile cell a membranaceous vestige, seed regular in shape.—Species about 40 in S. Amer., several of which may be somewhat planted in our southern country as kinds of *Cocos*; one common among florists in the juvenile state. (*Syagrus*: *wild pig*, a name used by Pliny for some kind of palm.)

*S. Weddelliana*, Becc. (*Cocos Weddelliana*, Wendl. *Glaziova Martiana*, Glaz.). Low tree, 4–7 ft., the trunk clothed in dark network, bearing slender foliage: lvs. 3–4 ft. long, ascending and gracefully curving, more or less scurfy, specially along the rachis: pinnæ one at a place on the rachis, very narrow and graceful, long-pointed, in the juvenile stage in which it is seen in house decoration 3–4 in. long and  $\frac{1}{4}$  in. or less broad. S. Brazil; collected by Dr. Weddell, on the Organ Mts., in 1831.



13. **ROYSTONEA**, O. F. Cook (*Oreodoxa*, Mart., not Willd.). Tall striking unarmed feather-palms of 3 or 4 species in the American tropics, sometimes planted far S.—Fls. monœcious, borne in heavy branching spadices beneath the crown of foliage; parts of perianth 6; stamens 6–12; staminodia in fertile fls. 6, scale-like; ovary 1, 3-celled, the stigmas sessile; pistillodes in sterile fls. spherical or ovoid: fr. small,  $\frac{1}{2}$  in. or less long, bluish, nearly globular or oblong: lvs. very large, gracefully spreading-curving, the petiole concavo-convex: veneration reduplicate: trunk single, columnar. (Roystonea: Gen. Roy Stone, American engineer known for his work in Porto Rico.)

Trunk swollen at base, then cylindrical: lvs. flat, the pinnæ lying in one plane.....1. *R. oleracea*  
Trunk swollen at or above the middle: pinnæ lying in two tiers or planes ...2. *R. regia*

1. ***R. oleracea***, O. F. Cook (*Oreodoxa oleracea*, Mart.). **CABBAGE PALM.** PALMISTE. Magnificent columnar tree with cylindrical trunk from an enlarged base, to 120 ft. tall, bearing a horizontally spreading crown, conspicuous erect lightning-rod unfolding bud in the top, and erect-spreading branching panicles far below the mass of foliage: lvs. with a single row or tier of pinnæ on either side the rachis: stamens protruding in the bud: fr. oblong,  $\frac{1}{2}$ – $\frac{5}{8}$  in. long, about half as wide, straight or slightly concave on one side. W. Indies; a much-planted and characteristic tree in trop. Amer.

2. ***R. regia***, O. F. Cook (*Oreodoxa regia*, HBK.). **ROYAL PALM.** Mostly a lower tree, the trunk swollen at or above the middle and tapering above, bearing a drooping more bushy crown, less conspicuous and often oblique terminal unfolding bud, and panicles covered by the hanging foliage: pinnæ standing in a double direction or tier on either side the rachis, the upper having an upward tendency: stamens included or covered in the bud: fr. globular or globular-oblong, nearly or quite as broad as long. S. Fla., Cuba; also much planted in the tropics.—***R. borinquena***, O. F. Cook (*Oreodoxa borinquena*, Reasoner), the **PORTO-RICAN ROYAL PALM**, usually has a bulge in the trunk but is sometimes cylindrical and slender: spadices more densely branched and covered with dark brown pubescence: fr. about  $\frac{1}{2}$  in. long, narrower than those of *R. regia*, somewhat flattened or concave on the back: little planted within our range. Porto Rico.

14. **ARCHONTOPHÆNIX**, Wendl. & Drude. A few species of feather-palms in Australia, one of which is widely planted in the open.—Trunks single, annular, spineless: lvs. terminal, forming a large crown, often light colored beneath, the segms. or pinnæ entire or somewhat split at the end, the intermediate longitudinal veins very pronounced, the keel for the most part not strongly ridged: infl. monœcious, standing on the trunk far below the lvs., with many pendulous branches, the spathes 2; fls. sessile, the staminate with sometimes 8 segms. and the pistillate with 3 or more and sometimes bearing 6 staminodia, the petals valvate; stamens 9–24, the filaments usually connate at or near the base: fr. small, globose or elliptic-globose, the nut in a shell that discloses a mace-like structure beneath; seed with broken or ruminate albumen. (Archontophœnix: Greek *majestic phoenix* or *palm*.)

***A. Alexandræ***, Wendl. & Drude. Slender palm, to 70 and 80 ft.: pinnæ long lanceolate-linear, glabrous and unarmed, at apex entire or 2-toothed, with 1 or 2 prominent lateral veins, 18 in. long and about 1 in. broad, grayish-glaucous beneath: fls. white; staminate solitary or 2 together, the pistillode with a slender style surpassing the 9–11 stamens, perianth parts very narrow; pistillate with 6 parts much alike, and 3 prominent stigmas sessile on the thick ovary: seed oval, without longitudinal furrows, inclosed in a thin bony endocarp; albumen strongly ruminated. (Named in honor of Princess Alexandra of Denmark, now Queen Dowager of Great Britain.) N. Australia; planted in American tropics and probably also within the U. S.—The palm passing in Calif. under this name and also as *A. Cunninghamiana* and *Seaforthia elegans* is regarded by O. F. Cook as wholly distinct, being separated as ***Loroma amethystina***, Cook. From Archontophœnix, the genus *Loroma* is distinguished by having the pistillode (in the staminate fl.) similar to the fertile pistil, much exceeded by the stamens and with 3 distinct rudimentary styles, as also by technical differences in fr. and seed. In *L. amethystina* the fr. is coral-pink, subglobose, about  $\frac{1}{2}$  in. long, with a thin fleshy pericarp, and with no



layer of bony palisade tissue under the enveloping fibers as in Archontophænix; seed rather broader than long, somewhat flattened on top and at base, not sulcate: the plant is supposed to be native of N. Australia. *Loroma Cunninghamiana*, Cook (*Archontophænix Cunninghamiana*, Wendl. & Drude), is the second species of the segregated genus, native in N. Australia, perhaps not in cult.

15. **PHŒNIX**, L. About a dozen species of feather-palms native in the trop. and subtrop. parts of Afr. and Asia; one is the date palm and others are grown in the open for ornament.—Fls. dioecious, in branching spadices borne among the foliage; calyx 3-lobed; petals 3 and usually distinct; stamens mostly 6, represented in fertile fls. by scales or a rim; ovaries 3, distinct, sometimes represented in the sterile fls. by minute pistillodes: fr. cylindrical, with 1 long grooved seed: lvs. long-pinnate, the lower pinnæ sometimes reduced to spines: vernation induplicate: trunk single or several, erect or reclined, usually clothed with old lf.-bases. (Phœ-nix: Greek, an early name for the date palm whether from Phœnicia or the fabled bird of Egypt is not clear.)

Pinnæ 2-ranked on either side of the rachis.

Lvs. flaccid (soft).....1. *P. rupicola*

Lvs. stiff and rigid.....2. *P. reclinata*

Pinnæ fascicled or scattered: dwarf palm.....3. *P. Roebelenii*

Pinnæ mostly more than 2-ranked.

Lvs. slender: grown for ornament.....4. *P. canariensis*

Lvs. robust, stout: grown for fr.....5. *P. dactylifera*

1. *P. rupicola*, T. Anders. Erect slender palm to 25 ft., with solitary naked trunk: lvs. 8-10 ft. long, bright green, glabrous, the petiole compressed; pinnæ soft in texture, 2-ranked, 16-20 in. long: spadices large, the fertile 3-4 ft. long: fr.  $\frac{3}{4}$  in. long, oblong, shining yellow. India.

2. *P. reclinata*, Jacq. St. 25 ft. and more: lvs. dark green, shining, 5-7 ft. long; pinnæ rigid in texture, 2-ranked, arched and recurved toward the apex, lanceolate, 1-1 $\frac{1}{2}$  ft. long and 1 in. wide, very sharp, the lowest ones spine-like: fertile spadix much branched, 20-40 in. long: fr.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, elliptical, red, the seed grooved on one side. Afr.—The hort. names *P. leonensis*, *P. senegalensis*, and *P. zanzibarensis* belong here.

3. *P. Roebelenii*, O'Brien. Sts. usually several, 5-6 ft. or less high, nearly or quite erect, often swollen and bulboid at base: lvs. 1-2 ft. long, dark shiny green, more or less flaccid, somewhat glaucous; pinnæ 6-8 in. long, very narrow, curved downward, long-pointed but not spinose, more or less filamentous below: fruiting peduncle long: fr. ovoid. (C. Roebelen was an orchid collector, Singapore.) S. E. Asia.—Useful as a pot- or tub-plant.

4. *P. canariensis*, Chaub. Stocky palm with wide-spreading top, extensively planted as a lawn tree in Calif. and also in Fla.: lvs. numerous, slender, curving outward and drooping at the end, bluish-green, petioles and spines greenish-yellow: pinnæ narrow, sharp and stiff-pointed, very strongly keeled, the lower ones spine-like: fr. smooth, shape and size of an olive. Canary Isls.

5. *P. dactylifera*, L. DATE PALM. Strong palm to 100 ft. and more, the trunk usually not perfectly erect and straight: lvs. very long, stiff, arching upward, more or less glaucous; pinnæ strongly keeled, the intermediate nerves fine, sharp and stiff-pointed, the lower ones represented by long and stiff spines, 4-ranked or the upper ones 2-ranked: fr. cylindric, 1-2 in. long, borne profusely on the long hanging strands of the spadix. Afr.

## 19. CYCLANTHACEÆ. CYCLANTHUS FAMILY

Stemless or sometimes caulescent plants, in some cases climbing, with the foliage of palms and the infl. of aroids; a few are cult. for ornament, being frequently met in greenhouses; all trop. American.—Fls. monœcious, in a dense simple spadix subtended by several bract-like spathes, the staminate and pistillate closely associated; perianth none or small; stamens mostly numerous, sometimes represented in the fertile fls. by long staminodia; carpels 2 or 4, spirally placed or sunken in the spadix, constituting a single ovary 1-celled and many-ovuled usually on 2-4 placentæ: fr. made up of the cohering carpels: lvs. fan-like, long-petioled, sometimes with holes in the blade.

**CARLUDOVICA**, Ruiz & Pav. Thirty to 40 species, shrubby or herbaceous, the st. erect, decumbent or climbing: lvs. 2-5-parted: staminate fls. in 4's surrounding a pistillate fl. which is sunken in the spadix; staminodia 4, long: fr. an aggregate of 4-sided many-seeded berries. (Carludov-ica: Carlos IV and Ludovia, his queen, of Spain.)

- Lvs. 2-parted or lobed ..... 1. *C. atrovirens*  
 Lvs. 3- or more-parted ..... 2. *C. palmata*

1. *C. atrovirens*, Wendl. Lvs. on long slender smooth angled petioles from the crown (as seen in greenhouses), very dark green and lighter beneath; blade with many strong parallel veins, split much below the middle into 2 lobes 2-3 in. wide terminating in a plicate or a lacerate apex: spadix short and small, hidden in the foliage. N. S. Amer.

2. *C. palmata*, Ruiz & Pav. St. very short or not evident: lvs. fan-shaped, standing 3-6 ft. high on slender channeled petioles; blades about 4-lobed nearly to the base and the lobes again divided into long more or less bifid segms. like a palm, the lower part often with hole, the margins drooping: fr. a cob-like long-peduncled body about 6 in. long. Peru.—Probably the main source of fiber for panama hats.

## 20. ARACEÆ. ARUM FAMILY

The aroids are upward of 100 genera and perhaps 1,500 species around the world, being specially developed in trop. countries; they are mostly of wet, damp, or shady places; many are cult. for ornament and interest, and a few yield important food products in their underground parts; many contain acrid principles.—Herbs, but sts. sometimes becoming hard and woody and tree-like in form, erect, prostrate, or tall-climbing by means of roots, sometimes epiphytic, a few floating, mostly more or less fleshy, juice sometimes milky: lvs. very various, from sword-shaped and parallel-veined to broad-hastate and netted-veined, the margins entire or lobed, some species with prominent holes in the blade, sometimes compound: the infl. is the most characteristic feature, being a densely fld. simple spadix subtended or surrounded by a bract which is often showy and constitutes "the flower" of gardeners, as in the cult. calla, the staminate fls. at the top and pistillate fls. beneath; fls. bisexual or unisexual, regular, the perianth lacking or represented by 4-8 scale-like parts, never showy; stamens 1 to many, sessile or with very short filaments, often united; ovary usually 1, with 1 to several carpels, and ovules 1 or more in each cell: frs. usually baccate, densely packed on the spadix.—The family contains many odd and grotesque plants. *Hydrosme Rivieri*, Engler (better known as *Amorphophallus Rivieri*, Dur.), is sometimes grown for curiosity. It sends up a stout purple scape 3-4 ft., bearing a single gigantic rose-colored spathe and a dark red spadix 2 ft. or more long: lf. pedately compound, 3-4 ft. across. Cochín-China. Species of true *Amorphophallus* are sometimes grown, as *A. campanulatus*, Blume, and *A. giganteus*, Blume. For Pothos of gardeners, see *Scindapsus*. Several native aroids are likely to be transferred to grounds, as the species of *Arisæma* or jack-in-the-pulpit (C, Fig. 7), *Peltandra*, and *Orontium* or golden-club.

A. Plants terrestrial (or epiphytic), not free-floating.

B. Lvs. broad, not grass-like.

C. Fls. naked (without perianth).

D. Spadix terminating in a long sterile part or appendage (without fls.) as in Cc, Fig. 7 ..... 1. ARUM

DD. Spadix not appendaged or not manifestly so (fl.-bearing to the top): partial exception in No. 2.

E. Habit erect (or not climbing): herbaceous.

F. Stamens joined together, forming one body.

G. Ovary few-ovuled, at the bottom of the single cell. . . . 2. ALOCASIA

GG. Ovary 1-celled with many ovules in 2 series on 3-5 parietal placentæ ..... 3. COLOCASIA

GGG. Ovary 1-celled with broad nearly central placentæ.

- H. Style none..... 4. CALADIUM  
 HH. Style disk-like, projecting beyond ovary..... 5. XANTHOSOMA  
 GGG. Ovary 2-3-celled and 2-3-lobed stigma..... 6. DIEFFENBACHIA  
 FF. Stamens distinct.  
   G. Fr. inclosed in the top-shaped tube of spathe, the blade of spathe falling by an articulation..... 7. SCHISMATOGLOTTIS  
   GG. Fr. included in spathe-tube that enlarges after flowering, the blade withering..... 8. ZANTEDESCHIA  
   GGG. Fr. not included in spathe-tube, the entire spathe falling or withering..... 9. AGLAONEMA  
 EE. Habit climbing; st. more or less woody.  
   F. Fls. bisexual.  
     G. Ovules solitary, at base of cell..... 10. SCINDAPSUS  
     GG. Ovules 2 in each cell, attached to base of septum or partition..... 11. MONSTERA  
   FF. Fls. unisexual..... 12. PHILODENDRON  
 CC. Fls. with perianth of 4-8 segms. or parts.  
   D. Stigma obscurely 2-lobed: ovules 1 or 2 in the cell: spathe recurved or reflexed, or at least widely spreading..... 13. ANTHURIUM  
   DD. Stigma 3-4-lobed: ovules 2-8: spathe flat, usually not reflexed 14. SPATHIPHYLLUM  
 BB. Lvs. very long and narrow, sword-shaped or grass-like..... 15. ACORUS  
 AA. Plant floating on the water, 6 in. or less across, the lvs. velvety..... 16. PISTIA

1. **ARUM**, L. A dozen species are now recognized, some of them very variable, in Eurasia, a few occasionally grown for curiosity, often under the name *Calla*.—Low simple herbs with underground rounded or depressed tubers, hastate or sagittate stalked lvs., and scape bearing a terminal “flower” which is a spathe (that withers rather than falls after anthesis) and a spadix of minute crowded naked fls., the spathe being the showy part, the spathe-tube constricted at the top and inclosing the lower fruitful part of the spadix which is terminated by a long sterile cylindrical appendage: fls. unisexual, the fertile at base, the staminate above with pistillodes (unfruitful pistils) below them and staminodes above them; ovules affixed on the side walls of the cell: fr. a fleshy berry. (*Arum*: the ancient name.)—Many plants once referred to *Arum* are now named in other genera. *A. crinitum*, Ait., is ***Helicodiceros muscivorus***, Engler (*Megotigea*, Raf.), differing technically in having ovules affixed at top and base of cell, and lvs. pedate; one species is in S. Eu., rarely grown as a specimen plant for its purple hairy horizontal spathe and spotted tube; odor putrid. *A. Dracunculus*, L., is ***Dracunculus vulgaris***, Schott: lvs. with 10-15 narrow segms., several to a st.: spathe purple, with heavy odor; spadix slender and projecting. *Medit. region.*

Spathe black-purple on inside..... 1. *A. palæstinum*  
 Spathe green or yellowish.

Petiole about as long as lf.-blade, about the length of the scape or shorter..... 2. *A. maculatum*  
 Petiole longer than blade and than the scape..... 3. *A. italicum*

1. ***A. palæstinum***, Boiss. (*A. sanctum*, Damm.). **BLACK CALLA**. Lvs. cordate-hastate, 6-8 in. long: scape shorter than petioles: spathe about equaling lvs., the tube short and green; blade oblong-lanceolate, greenish outside and black-purple within; spadix not equaling spathe, upper part dark purple. Syria, Palestine.

2. ***A. maculatum***, L. **CUCKOO-PINT**. About 1 ft. high: lvs. appearing in spring, hastate or sagittate, with deflexed lobes, often spotted black: spathe 6-10 in. long, constricted in middle, edges inflexed, edged and more or less spotted purple; spadix usually purple. Eu., N. Afr., variable.

3. ***A. italicum***, Mill. Large and stouter than No. 2, blooming later: lvs. earlier, triangular-hastate with spreading lobes: spathe folded or falling down in front at anthesis closing the opening; spadix yellow. W. Eu., N. Afr.

2. **ALOCASIA**, Neck. Sixty to 70 species of trop. Asia and isls., grown as specimen plants for the large foliage, mostly under glass; the foliage is often handsomely colored and variegated, the substance of the lvs. usually thick and stiffish.—Strong or small plants with a thick short stock: lvs. with long sheathing petioles, the blade sagittate-cordate, often shallowly peltate (always peltate in young state): spathe usually glaucous, convolute, the blade oblong

and mostly boat-shaped, the tube ovoid or oblong and much shorter than blade; spadix shorter than spathe, sometimes produced into a short sterile appendage; fls. unisexual and naked; stamens joined to form a 6-angled body; sterile staminate fls. or staminodes beneath the others; ovary 3-4-celled, with few ovules affixed at base of cell: fr. mostly a reddish berry. (*Alocasia*, variant of *Colocasia*.)—Many named kinds are in choice hothouse collections, some of them hybrids.

- Lvs. entire on the margin, or at most only undulate.  
 Lf.-blades green, the markings chiefly on petioles.....1. *A. zebrina*  
 Lf.-blades variously colored.  
 Blade purple with metallic-green sheen, not spotted (there is a variegated form).....2. *A. indica* var.  
 Blade mostly in shades of green but variously marked or lined (white-variegated forms of No. 2 may be sought here).  
 Veins dark purple on dark metallic-green blade.....3. *A. cuprea*  
 Veins white and blade blotched and mottled white.....4. *A. macrorrhiza*  
 Veins and midrib white or silvery, not blotched.  
 Midrib and main nerves not bordered with color.....5. *A. Lowii*  
 Midrib and nerves with pale or gray-green color-bands along them.....6. *A. Korthalsii*  
 Lvs. with deeply notch-lobed margins.....7. *A. Sander-*  
iana

1. *A. zebrina*, Koch & Veitch. St. short or none: blades green, 15-30 in. long, broadly ovate or triangular-ovate, not peltate, with deep sinus at base, main part oblong-triangular and short-acuminate, basal lobes oblong-ovate and obtuse; petioles equaling or exceeding lvs., banded with dark green and white: spathes long-peduncled, greenish; spadix white. Luzon, Philippines.

2. *A. indica*, Schott, var. *metallica*, Schott (*A. plumbea*, Van Houtte). Stout coarse plant, with st. to 6 ft.: blades 2-4 ft. long, deep reddish-purple with lead-green sheen, triangular-sagittate with slightly undulate margins, deeply cordate, not peltate, the main part triangular-acute, basal lobes ovate and nearly acute, the petioles long and stout: spathes stalked, blade yellowish or purplish inside. Malaya.—*A. indica* itself (India and Malaya) is green-leaved. Var. *variegata*, Engler, has lvs. mottled and lined with grayish-white.

3. *A. cuprea*, C. Koch (*A. metallica*, Hook. f.). Rhizome tuberous: blades  $1\frac{1}{2}$  ft. long and 1 ft. broad, ovate, peltate, dark metallic green with darker midrib and veins, under side purple, main part oblong-ovate and acuminate, basal lobes ovate; petiole to 2 ft., green: spathe with purple tube and blade green to purple. Malaya.

4. *A. macrorrhiza*, Schott. St. tall; large stout plant of striking appearance, 6-15 ft. and more: blades 3 ft. long, broad-sagittate and pointed, somewhat undulate, main part triangular-ovate and acute, the basal lobes much shorter, the midrib broad and conspicuous, green in the type but blotched and mottled white in the variegated form: spathe with glaucous-green yellowish blade. India, Malaya.

5. *A. Lowii*, Hook. f. Rhizome elongated and tuberous: blades long-sagittate,  $1\frac{1}{2}$  ft. long and 6 in. broad, main part long-triangular and acuminate, basal lobes oblong-triangular and obtuse, above olive-green with silvery-white side nerves and whitish margins, beneath purple; petioles long, rose-color: spathe whitish-green. (Early grown by Messrs. Hugh Low & Son, nurserymen, England.) Malaya.

6. *A. Korthalsii*, Schott (*A. Thibautiana*, Mast.). St. short: blades 2 ft. long and 18-20 in. broad, cordate-ovate, sharp-acuminate, the basal lobes short and obtuse, peltate, olive-green with broad silvery rib and veins, deep purple beneath; petiole long, greenish: spathe pale green. (Peter W. Korthals was a German botanist of the 19th century who traveled in Malaya.) Malaya.

7. *A. Sanderiana*, Bull. Small or medium-sized handsome plant: blades sagittate-ovate, peltate, 6-16 in. long, main part narrow-triangular and cuspidate-acuminate, basal lobes narrow-triangular and obtuse, margins deeply sinuate-lobed, upper surface dark metallic-green with white nerves and usually white margins, under surface tinged purple; petioles striped brownish: spathe greenish and spadix greenish-white. (Bears the name of Messrs. Sander & Co., nurserymen of Belgium and England.) Mindanao, Philippines.

3. **COLOCASIA**, Schott (*Leucocasia*, Schott). Seven or 8 recognized species in trop. Asia and Polynesia, large coarse herbs grown for the ornament of their large lvs. and stately habit, and also for edible tubers.—From *Alocasia* the genus differs technically in the ovary characters, the ovules being many and



borne on the walls (on the parietal placenta): lvs. always peltate, mostly thick in texture: tuber-bearing: as in related genera, the pollen-bearing staminate part of the spadix is separated from the pistillate part by a section of staminodes. As cult. plants, they are commonly known as ELEPHANT'S EAR. (Coloca-sia: an old Greek name, associated with the colcas [culcas] of the Arabs and used in Egypt.)

Grown mostly for ornament: appendage of spadix as long as the two staminate parts (polliniferous and staminode parts).....1. *C. antiquorum*  
Grown mostly for food: appendage much shorter than polliniferous staminate part.....2. *C. esculenta*

1. *C. antiquorum*, Schott. Growing to great size, a few ft. high under favorable conditions, with short thick stock and lf.-blades hanging nearly to the ground: petioles long and stout; blades green, oblong-ovate, cordate but the sinus not reaching to the petiole, main part apiculate at apex, the basal lobes rounded and with the basal midribs well inside the margin: peduncle or scape usually solitary, much shorter than petioles: limb of spathe wide open, pale yellow, 6-15 in. long, the spadix with a long terminal appendage. E. Indies.—There are several color-forms: Var. *illustris*, Engler. Petioles purplish; blade large, oblong-ovate, with black-green spots between main veins. Var. *Fontanesii*, Schott, with purplish petioles; blade dull green with violet margins and nerves. Var. *euchlora*, Schott, with purplish petioles; blade dark green with violet margins. *C. antiquorum* yields the Egyptian taro or culcas, inferior to the taro of Amer. and the Pacific.

2. *C. esculenta*, Schott (*C. antiquorum* var. *esculenta*, Schott. *Caladium esculentum*, Vent.). TARO. EDDO. DASHEEN. Similar, but yielding large spherical underground tubers abundantly, which are important articles of food; the blanched shoots from the tubers may be utilized as a winter vegetable: limb of spathe trough-shaped or inrolling, the spadix with a very short sterile appendage. Probably native in Pacific Isl.

4. *CALADIUM*, Vent. A dozen to a score of trop. American plants, two of which are in common cult. under glass and in the open far S. for the thin colored lvs. of very many patterns, known as the "fancy-leaved caladiums."—From Alocasia and Colocasia the genus differs in the ovary, in which the many ovules are borne in the middle, on a central placenta: style none: lvs. peltate in the usual cult. kinds but not so throughout the genus: spathe with boat-shaped limb; spadix somewhat shorter than spathe: berry white. (Cala-dium: name probably of E. Indian origin.)

Lf. broad, ovate to round-ovate in general outline.....1. *C. bicolor*  
Lf. narrow, lance-ovate to oblong-ovate.....2. *C. picturatum*

1. *C. bicolor*, Vent. The commoner species, in endless vars. under a multitude of names: petiole elongated, glaucous or pruinose toward top, otherwise green; blade variously colored above, somewhat glaucous beneath, sagittate-ovate, ovate-triangular to round-ovate, the basal lobes joined one-fifth to one-third their length and separated by a narrow sinus: spathe with tube green outside and whitish-green inside, the throat usually purplish, the blade cuspidate and white at apex. W. Indies to Brazil and Andes.—The spotted, blotched, and variegated thin almost translucent lvs. are well known, the marks being white, grayish, purple, rose, and others.

2. *C. picturatum*, C. Koch. Petioles green, more or less variegated; blade variously colored above, pale or not glaucous beneath, sagittate-lanceolate, the basal lobes one-sixth to one-fourth their length and separated by a broad triangular sinus: spathe with tube green outside and purplish inside, the blade white throughout, more or less apiculate. Brazil and Peru; runs into fewer forms than No. 1.

5. *XANTHOSOMA*, Schott. The New World analogue of Colocasia and Caladium, with about 40 species, grown for ornament and esculent underground tubers.—Closely allied to Caladium, but differing technically in the shield-like style that projects out beyond the ovary: strong herbs, sometimes with woody stock, thick more or less tuberous rhizomes: lvs. thick, long-petioled, not peltate, the blade sagittate or hastate and the main nerve at the lower side of either basal lobe more or less marginal as it joins the petiole,



sometimes 3-lobed or even pedatisect: spathe with an ovoid or oblong convolute tube, and a narrow boat-shaped or trough-shaped blade exceeding the spadix; anthers 4-6, united into an angular column. (Xanthosoma: Greek *yellow body*, referring to the yellow stigmoid disk.)—This genus yields the native taro-like tubers of the American tropics, known as Tanier, Yautia, Malanga, and others, the product apparently of the first three below, and perhaps of other species.

- Lvs. and petioles plain light green, not pruinose or glaucous.....1. *X. sagittifolium*  
 Lvs. dark green above, ashy-green beneath, pruinose, petiole dark green and sometimes obscurely striped.....2. *X. atrovirens*  
 Lvs. with violet or purplish midrib, nerves, and petiole.....3. *X. violaceum*  
 Lvs. green with broad white rib and white main nerves.....4. *X. Lindenii*

1. *X. sagittifolium*, Schott. Eventually producing a caudex or trunk 3-4 ft. high: lvs. plain green with very long green petiole; blade  $1\frac{1}{2}$ -3 ft. long and nearly as broad, sagittate-ovate, abruptly sharp-pointed, the main part twice longer than the rounded basal lobes, the bottom nerves nearly marginal at the petiole: scape or peduncle longer than the greenish-white spathe; spadix much shorter than spathe, the fertile (pistillate) part nearly as long as the sterile (staminate) part. W. Indies, S. Amer.—Much like a Colocasia, but the lvs. not peltate.

2. *X. atrovirens*, C. Koch. Plant without above-ground trunk: lvs. dark rich green above and gray-green beneath, pruinose or glaucous, on long dark green sometimes lined petiole, the rib and nerves paler; blade as large as in No. 1 or even larger, sagittate-ovate, the main part somewhat oblong and short-cuspidate and twice or more exceeding the obtuse ovate or somewhat rhomboid basal lobes: blade of spathe dull green; spadix stipitate, with pistillate part one-third length of the reddish staminate part, the sterile part pale rose-color. S. Amer.

3. *X. violaceum*, Schott. Plant without trunk above ground: lvs. pruinose (at least when young), green, paler beneath, rib and nerves and usually the margin violet or purplish, on long purplish petiole; blade oblong-sagittate-ovate, abruptly sharp-pointed, the main part three to four times longer than the somewhat triangular obtuse basal lobes, the bottom nerves at margin near the petiole: spathe whitish-yellow inside; spadix with pistillate part four times shorter than staminate part, the sterile part violet. W. Indies and S. Amer.

4. *X. Lindenii*, Engler (*Phyllotanium Lindenii*, André). Plant with strong stock: lvs. pale green with rib and main side nerves white, making an ornamental subject, the petiole pale green; blade hastate-oblong and acute, the main part about twice as long as the obtuse usually conspicuously spreading basal lobes: spathe white. Colombia; a glasshouse plant. Early grown by Messrs. Linden, Belgian horticulturists.

6. **DIEFFENBACHIA**, Schott. Trop. American woody-stemmed plants grown under glass for the spotted or variegated foliage, 25-30 species.—Caudex thick, erect or at base creeping, leafy toward the top: lvs. with long clasping or sheathing petiole and oblong to ovate entire blades, mostly broad and conspicuous midrib and curving-ascending side-veins: peduncles from the sheaths, shorter than petioles: spathe oblong, persistent, the lower part convolute and including the pistillate fls., throat open, blade narrow, trough-shaped or partially open, straight or recurved; spadix erect, nearly as long as spathe; ovary 2-3-celled, with similarly lobed stigma. (Dieffenbachia: J. F. Dieffenbach, 1794-1847, German physician and botanist.)—Many named kinds are known to fanciers, nearly all referable to 2 species.

- Petiole broadly grooved or channelled.....1. *D. picta*  
 Petiole little or not at all channelled or not broadly so.....2. *D. Seguine*

1. *D. pictum*, Schott. St. 3-4 ft. long, more or less prostrate at base, an in. or less thick: petioles of lower lvs. long, broadly canaliculate, with obtuse margins; blade oblong to oblong-elliptic or oblong-lanceolate, the base rounded or acute, narrowed to apex and acuminate-cuspidate, dull green and shining both sides, with many white or yellowish irregular marks and blotches, the primary lateral nerves 15-20 on either side and ascending: spathe narrowly long-cuspidate. S. Amer.—As now understood, this species apparently produces the greater number of the white-spotted vars. Both species are widely variable.

2. **D. Seguine**, Schott. St. ascending, 3-6 ft.: petioles not channelled (or very little so), green or white-striped and -dotted; blade oblong or ovate-oblong, rounded or somewhat cordate or even acutish at base, short-cuspidate at apex, green above and light green beneath, sometimes spotted, midrib broad and thick, the primary lateral nerves imbedded above and very prominent beneath and about 9-15 on either side: spathe short- or long-cuspidate. W. Indies and S. Amer.—The “dumb cane” of the W. Indies, those who chew it said to lose the power of speech.

7. **SCHISMATOGLOTTIS**, Zoll. & Mor. Seventy to 80 species in the Malayan region, one of which is frequent in glasshouses for its white-marked foliage.—Resembling *Dieffenbachia*, but technically differing in floral characters, the stamens being free, ovary 1-celled, blade of spathe articulated and falling entire: caudex or rhizome mostly evident: lvs. oblong to ovate-cordate, sometimes hastate, in the cult. plants usually marbled, spotted, or striped (often with translucent areas), the sheathing petiole longer than the blade: peduncles solitary or fascicled, shorter than petioles: spathe with convolute tube which incloses the oblong green or yellowish fr. (*Schismatoglot-tis*: Greek *falling tongue*, referring to the deciduous spathe-limb.)

**S. picta**, Schott. The common species and the one to which most of the hort. names are probably to be referred, native in the E. Indies: st. above ground: petioles 8-12 in. long, pale green; blade thin, pale green above, marked on either side the midrib by white dots and patches, cordate, ovate or oblong-ovate, acuminate, 6-8 in. long: spathe  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, green, greenish-yellow, short-cuspidate.

8. **ZANTEDESCHIA**, Spreng. (*Calla* of cultivators. *Richardia*, Kunth). Perennial rhizomatous herbs of S. Afr., with showy spathes, one of them in commonest cult. and others frequently grown; 8 species are recognized.—Lvs. all basal, long-petioled, the blade hastate to cordate-ovate to lanceolate, sometimes spotted: peduncles equaling or exceeding the lvs. and appearing with them; spathe white or yellow, open and corolla-like, with pointed usually recurved tip, blade not deciduous; spadix pistillate on lower part, staminate on upper part, not appendaged at top; fls. naked; stamens 2-3, free; ovary 1- or more-celled, ovules usually 4 in each cell, sometimes bearing staminodia: fr. baccate, included in the tube of the spathe. (*Zantedesch-ia*: Francesco Zantedeschia, who wrote on Italian plants in 1825).—Here belong the callas of florists. Of the true *Calla* there is but a single species, **C. palustris**, L., a small white-spathed marsh plant of the upper north temp. and subarctic region around the globe; sometimes used in bog-gardening.

Lvs. sagittate or deeply cordate.

Lf.-blade uniformly green: spathe large and white. .... 1. *Z. æthiopica*

Lf.-blade spotted: spathe milk-white or yellow.

Spathe crimson at the base. .... 2. *Z. albo-maculata*

Spathe without blotch at base. .... 3. *Z. Elliottiana*

Lvs. lanceolate. .... 4. *Z. Rehmannii*

1. **Z. æthiopica**, Spreng. **CALLA** of gardeners. Robust plant standing  $2\frac{1}{2}$  ft. and more high, with smooth shining green cordate-ovate or sagittate-ovate lvs. with slender cusp at apex, and fragrant fls.: spathe white or creamy-white, 5-10 in. long, with an open broad and flaring limb and a long recurved cusp; spadix prominent but much shorter than spathe. S. Afr. (Cape, Natal).—Variable; double and triple spathes sometimes occur. Var. **minor**, Engler, is smaller, 12-18 in. high, with spathes 3-4 in. long.

2. **Z. albo-maculata**, Baill. **SPOTTED CALLA**. Petiole short and blade much longer than broad (12-18 in. long), with spreading triangular lobes at base, at apex long-acute and cuspidate, prominently white-spotted: spathe 4-5 in. long, trumpet-shaped, yellow or milk-white, with crimson or purplish spot in throat; spadix included. S. Afr. (cent. Cape region).

3. **Z. Elliottiana**, Engler. **GOLDEN CALLA**. Petiole long, 2 ft. or more; blade ovate to orbicular-ovate, cordate, abruptly narrowed to a cuspidate apex, with white or translucent spots: spathe 4-6 in. long, rich yellow, not blotched; spadix included. S. Afr. (Cape, Natal, Transvaal).—First exhibited 1890 before Royal Hort. Society, London, by Capt. Elliott of Farnborough Park.

4. *Z. Rehmannii*, Engler. RED or PINK CALLA. Dwarf: lvs. lanceolate to long-lanceolate, taper-pointed, gradually narrowing to petiole, white- or translucent-dotted: spathe 3-4 in. long, trumpet-shaped with cuspidate tip, rose-color or red, sometimes almost white. S. Afr. (Natal; discovered by Mr. Rehmann).

9. *AGLAONEMA*, Schott. Upwards of 40 small herbs of India and Malaysia, two or three grown in hothouses for the white-marked foliage.—St. erect or sometimes decumbent, short or long, with basal shoots: petiole equaling or shorter than blade, sheathing; blade oblong or oblong-lanceolate to ovate-lanceolate, with thick midrib and few lateral nerves: peduncles in clusters from the lower sheaths, shorter than the petioles; spathe small, straight, green or yellowish, open above, finally withering; spadix equaling or less than the spathe; fls. unisexual and naked; stamens 2, free; ovary 1- or 2-celled, often with staminodia, ovules 1 in each cell: frs. few, baccate, yellow or reddish, not included in spathe and therefore conspicuous in little clusters on slender stalks. (*Aglaone-ma*: Greek *bright thread*, perhaps referring to stamens.)

Lvs. usually somewhat cordate at base; nerves mostly more than 5.....1. *A. costatum*  
Lvs. not cordate; nerves not exceeding 5.....2. *A. pictum*

1. *A. costatum*, N. E. Br. St. short, branching at base, making a low spreading plant: lvs. thickish, ovate or oblong-ovate, rounded or mostly somewhat cordate at base, acute at apex, 4-5 or more in. long, with white spots and midrib, the main lateral nerves 7 (or 5) -10 on either side and strongly arching: spathe  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long,  $\frac{1}{2}$  in. diam., whitish-green; spadix stipitate, 1 in. long, protruding, milk-white. Malaya.

2. *A. pictum*, Kunth. St. 2-3 ft., mostly erect: lvs. oblong-elliptic, obtuse or acute at base, apex acuminate and cuspidate, to 6 in. long, main lateral nerves 4-5 on either side, curving upward toward the margin, variously white-clouded or spotted: spathe about 1 in. long and half or less broad, acuminate. Malaya.

10. *SCINDAPSUS*, Schott. Two kinds are frequently grown in the warm-house for the maculate foliage; the number of species in the genus is about 20, in Malaysia.—Climbing by rootlets, more or less woody, usually large: petioles broad and sheathing, abruptly bent; lf.-blades oblong-lanceolate to ovate-lanceolate or ovate, acuminate: peduncles short; spathe boat-shaped, expanded, deciduous; spadix about equaling spathe, densely fld.; fls. bisexual, naked; stamens 4, more or less coherent; ovary 1-celled and 1-ovuled, the style noné. (*Scindap-sus*: old Greek name of some kind of vine.)

Lvs. glaucous, unequal-sided.....1. *S. pictus*  
Lvs. not glaucous, sides nearly equal.....2. *S. aureus*

1. *S. pictus*, Hassk. Very tall climber with angular st., branching: lvs. thick, glaucous, obliquely ovate-oblong or broader, rounded or slightly cordate at base, narrowed and cuspidate at apex, one side narrower than other, spotted above with dark green: spathe white, ovate-oblong, prominently pointed. E. Indies.—Var. *argyræus*, Engler, is the form mostly in cult., the lvs. silvery-spotted.

2. *S. aureus*, Engler. Frequent in warmhouses under the name *Pothos aureus*; of *Pothos* proper, a genus of the Old-World tropics, no species appear to be in general cult. in this country: tall climber usually with pendulous branches, st. sulcate between the nodes: lvs. not very thick, ovate to ovate-oblong, more or less cordate at base, short-pointed, margins sometimes lobed on mature plants, smooth and shining, not glaucous, blotched with pale yellow: apparently does not bloom in cult. Solomon Isls.

11. *MONSTERA*, Adans. Climbing plants of trop. Amer., of nearly or quite 30 species, one common in greenhouses for its great lvs. full of holes.—Differs technically from *Scindapsus* in having 2 ovules in each cell: stout branching, more or less woody plants, with large usually distichous thick lvs. which are entire, sometimes pinnatifid, often conspicuously perforated, petiole long and sheathing: spathes on axillary peduncles, lanceolate, ovate or oblong-ovate, short-pointed or apiculate, boat-shaped, becoming deciduous; spadix

thick and densely fld., sessile, shorter than the spathe; fls. bisexual, naked: frs. cohering into a cone-like body. (Monste-ra: name unexplained.)

**M. deliciosa**, Liebm. CERIMAN. Tall straggling strong climber with hanging cord-like roots: lvs. 2-3 ft. long and broad, thick, pinnately cut and much perforated with oblong or elliptic spaces: spathe white, about 1 ft. long, the main part open with revolute margins; spadix 8-10 in. long, ripening into a large fr. that is eaten in the tropics. Mex., Cent. Amer.

**12. PHILODENDRON**, Schott. Tree-climbers (rarely erect) of the American tropics, more than 200 recognized species, a few grown under glass for ornament.—Mostly with hard woody sts., branching, the internodes often elongated: lvs. thick, ovate to oblong, more or less cordate or sagittate, entire, lobed, or pinnately parted, the petiole sheathing: peduncles commonly short, single or fascicled, axillary or terminal, the spathe thick and persistent, variously colored and often fragrant, the limb boat-shaped; spadix not exceeding the spathe, densely fld., becoming succulent in fr.; fls. unisexual and plant monœcious, naked; stamens 2-6 united into one body; ovary 2- to several-celled. (Philoden-dron: Greek *tree-loving*.)—Of some of the plants named Philoden-dron in cult. the fls. are unknown and their botanical position is doubtful. *P. pertusum*, Kunth & Bouché, is *Monstera deliciosa*.

- |  |                           |
|--|---------------------------|
| Petiole pubescent or hairy.....            | 1. <i>P. verrucosum</i>   |
| Petiole glabrous or with rough points..... |                           |
| Lf. red, at least when young.....          | 2. <i>P. Devansayanum</i> |
| Lf. green.....                             | 3. <i>P. giganteum</i>    |

1. **P. verrucosum**, Math. (*P. Carderi* and *P. Lindeni*, Hort.). St. gray-green, angular, swollen at nodes: petioles red, bearing long bristles and hairs; lf.-blade ovate-cordate with a deep close sinus, acute at apex, glabrous, polished green and often with paler lines and sunken nerves, beneath bright green with salmon-violet lines: spathe purplish. Costa Rica to S. Amer.

2. **P. Devansayanum**, Lind. St. short and stout: petiole terete, green, or when young purplish, perhaps with rough points; blade broadly ovate-cordate or almost orbicular, long-acuminate, deep red at least when young: spathe margined red. (Dedicated to M. de la Devansaye, president Société Hort. d'Angers et du Maine et Loire, France.) Peru.

3. **P. giganteum**, Schott. Very large, tall-climbing, with hanging roots: petiole often 3 ft. and more long; blade cordate-ovate, 2-3 ft. long, entire, with sinus open near the blade, apex acute; spathe 6-10 in. long, the tube purplish outside, limb pale green becoming yellowish. W. Indies.

**13. ANTHURIUM**, Schott. Trop. American aroids of about 500 species, some of which are grown under glass for the foliage and showy infl.; many of the hort. names represent hybrids and variants.—Plants of various habit, the st. woody or herbaceous, erect, ascending, creeping or climbing by roots: lvs. entire, lobed or deeply parted or digitate, thick and usually stiffish, mostly ovate with cordate, sagittate, or hastate base, green or variously colored, the petiole long or short and geniculate or kneed near the top: peduncle usually long; spathe ovate, elliptic, or lanceolate, green, yellowish, or purple, widely spreading or reflexed and sometimes twisted, the spadix mostly standing alone, sometimes coiled, without sterile end or appendix; fls. bisexual, with perianth of 4 narrow segms.; stamens 4; ovary 2-celled, with 1 or 2 ovules in each; stigma somewhat 2-lobed: fr. baccate. (Anthu-rium: Greek *tail-flower*.)

- |  |                            |
|--|----------------------------|
| Lvs. plain green: infl. the showy part.              |                            |
| Spadix straight or lightly curved.....               | 1. <i>A. Andrianum</i>     |
| Spadix coiled.....                                   | 2. <i>A. Scherzerianum</i> |
| Lvs. conspicuously marked with white or dark colors. |                            |
| Markings green or essentially so.....                | 3. <i>A. Veitchii</i>      |
| Markings white or silvery white.                     |                            |
| Blade of lf. long and narrow, taper-pointed.....     | 4. <i>A. Warocqueanum</i>  |
| Blade oval, cordate; petiole 4-angled.....           | 5. <i>A. magnificum</i>    |
| Blade similar; petiole terete or nearly so.....      | 6. <i>A. crystallinum</i>  |



1. *A. Andræanum*, Lind. St. short and erect, the plant low: petioles slender and longer than blades, the latter broad, oblong- to oblong-ovate-cordate, prominently pointed, with a deep narrow sinus and slightly peltate, 10–12 in. long, green: spathe cordate-ovate, thick, 4–6 in. and more long, strongly nerved, horizontal or spreading, brilliant orange-red (but varying to pink, rose-color, and even white); spadix 3–5 in. long, yellowish with white band below. (Collected in Colombia in 1876 by Ed. André.) Colombia; common and variable in cult.

2. *A. Scherzerianum*, Schott. St. very short: petioles equaling or exceeding blades, slender, sulcate above; blades narrow, long-lanceolate or long-elliptic, 4–8 in. or more long and 1–2 in. broad, long-pointed, green, with a strong vein parallel with each margin: spathe on a long and slender peduncle, broadly ovate to ovate-oblong, deep intense red (forms running to rose, salmon, white, spotted, and other colors), 2–4 in. long, lightly parallel-veined; spadix curled or coiled, yellow. (Discovered in Guatemala by M. Scherzer.) Cent. Amer.; forms numerous.

3. *A. Veitchii*, Mast. Robust species, the st. 1–3 ft.: petioles slender, more or less angled; blades large, 2–3 or 4 ft., and narrow, long-oblong, hanging, obtuse or short-acute, the base deeply cordate with close sinus, stiff, rich metallic-green with very prominent veins (specially beneath) arching from the midrib: peduncles 1–2 ft. long; spathe greenish or white-green, oblong- or ovate-lanceolate, horizontal, long-pointed, mostly 3–5 in. long; spadix nearly equaling or somewhat exceeding spathe, straw-color. (Introduced by Messrs. Veitch, nurserymen, England.) Colombia.

4. *A. Warocqueanum*, Moore. Very strong, of striking character: petioles terete; blades large, 2–4 ft. and narrow, oblong-lanceolate and long-acuminate, deeply and closely cordate, rich velvety green and rib and main veins nearly white, the 2 main lateral veins running parallel to margins: peduncle about 1 ft. long; spathe very narrow, linear-lanceolate, green, reflexed, 3–4 in. long; spadix about equaling spathe. (Dedicated to M. Warocqué, eminent Belgian amateur.) Colombia.

5. *A. magnificum*, Lind. Petioles 4-angled and somewhat winged at top; blades not narrow, cordate-ovate, 1–2 ft. long, the sinus broad, apex short-acuminate, upper surface olive-green with prominent white nerves that more or less join toward the margins: peduncle long, the spathe lanceolate to oblong, 4–8 in. long, green or reddish, becoming recurved; spadix equaling or exceeding spathe, dull violet. Colombia.

6. *A. crystallinum*, Lind. & André. Stout species on the order of No. 5, but petiole terete; sinus shallow and narrow (basal lobes often overlapping), upper surface deep velvety green, veins very prominent and broadly banded and conspicuously interlocked: peduncle about 2 ft. long; spathe very narrow, linear-oblong and sharp-pointed, 4–6 in. long, horizontal or reflexed, green; spadix slender, equaling or exceeding spathe. Colombia, perhaps Peru.

14. **SPATHIPHYLLUM**, Schott. Nearly or quite 30 species, mostly in the American tropics, two or three frequently grown as warmhouse foliage plants. —Acaulescent or short-stemmed: petioles equaling or exceeding blade, the latter oblong or nearly lanceolate and sharp-acuminate, tapering or rounded at base, midrib strong, side veins many and ascending or nearly right angles to rib: peduncles equaling or exceeding lvs.: spathe oblong or lanceolate, ascending or wide-spreading, acuminate, persistent, white or greenish, exceeding the free erect spathe; fls. bisexual and fertile, with perianth of free or connate segms.; stamens as many as segms.; ovary mostly 3-celled with few to several ovules in each; stigma 3–4-lobed: fr. baccate. (Spathiphyllum: Greek leaf-spathe, referring to the character of the spathe.)

Lf.-blade rounded at base. . . . . 1. *S. floribundum*  
Lf.-blade tapering at base. . . . . 2. *S. Patini*

1. *S. floribundum*, N. E. Br. Petioles 4–6 in. long; blades oblong-elliptic or oblong-lanceolate, about 6 in. long and 1–1½ in. broad, rounded at base, acuminate at apex, unequal-sided, rich green above and paler beneath: spathe oblong-lanceolate, long-cuspidate, about 3 in. long, spreading, white on both sides; spadix yellowish or nearly white, shorter than spathe. Colombia.

2. *S. Patini*, N. E. Br. (*S. candidum*, N. E. Br.). Petioles 8–12 in. long, equaling or exceeding the blades which are oblong-lanceolate, narrowed at both ends, very acute at apex, green: spathe oblong-lanceolate, acuminate, spreading or recurved,



about 3 in. long, white- or greenish-nerved; spadix slender, usually less than spathe. (Introduced to the Williams Nursery, England, by the collector, M. Patin.) Colombia.

15. **ACORUS**, L. Two paludose species in the northern hemisphere, planted in bog-gardens.—Rhizome creeping; lvs. grass-like or sword-shaped, long and slender without distinction of petiole and finely parallel-veined; peduncle or scape keeled, bearing 1 apparently lateral naked greenish spadix but the spathe lf.-like and continuing the direction (*B*, Fig. 7); fls. bisexual, with perianth of 6 concave or hooded segms.; stamens 6, with flattened anthers; ovary 2-4-celled with 2 to several ovules in each; fr. baccate, closely set on the spadix. (*Ac-orus*: the ancient name.)

Plant about 1 ft., grass-leaved: spathe not much prolonged.....1. *A. gramineus*  
Plant 2 ft. and more, sword-leaved: spathe prolonged like a lf.....2. *A. Calamus*

1. **A. gramineus**, Soland. Small tufted plant with narrow long-pointed grass-like lvs., about 1 ft. high, planted in water-gardens, particularly the striped-leaved var.: spadix slender, 1-2 in. long, lengthening in fr., the spathe narrow and usually not prominent, 3-6 or 8 in. long. Cent. and E. Asia.

2. **A. Calamus**, L. SWEET FLAG. Rootstocks stout and aromatic, yielding the drug calamus: lvs. 2-6 ft.,  $\frac{1}{3}$ - $\frac{3}{4}$  in. broad (with narrower-leaved forms), cult. mostly in the striped-leaved var.: spadix hard and dense, 2-4 in. long, the spathe produced to the length of the lvs. (*Cal-amus* is an ancient name for reed.) Around northern hemisphere.

16. **PISTIA**, L. One free-floating clumpy little plant (sometimes rooting in mud) with not at all the look of an aroid, used in aquaria and warm water-gardens.—Lvs. simple and entire, oblong to cuneate with very rounded ends, many-ribbed, lively green but velvety-scurfy: spathes small, sessile or nearly so in the axils, lf.-like, white, the spadix adnate to it and shorter; fls. unisexual, naked; stamens 2; ovary 1-celled with many ovules; fr. baccate. (*Pis-tia*: probably from the Greek *pistos*, in reference to the aquatic habit.)

**P. Stratiotes**, L. WATER-LETTUCE. Stoloniferous, with long hanging roots; rosette-like tufts 2-6 in. across. (*Stratiotes*: an ancient name, applied here by ante-Linnaean writers.)—In many parts of the world in warm and trop. regions, native Fla. to Tex.; runs into several lf.-forms.

## 21. BROMELIACEÆ. BROMELIA OR PINEAPPLE FAMILY

About 40 genera and above 900 species of herbs and subshrubs, usually with persistent stiff equitant or rosette lvs. and mostly epiphytic, natives in trop. Amer. with minor extensions into extra-trop. regions; a few are in frequent cult. for ornament, and the pineapple for food.—Plants mostly scurfy, largely monocarpic (fruiting but once and then dying, although suckers may arise from the base): lvs. various, but in representative groups elongated and stiff, with entire or spinulose margins, sheathing or overlapping at base: fls. regular and commonly bisexual, in dense spikes or heads provided with large often colored and showy imbricated bracts, in other species in branching panicles; perianth small, of 6 parts in 2 series, representing calyx and corolla, each series sometimes united into a tube, the segms. erect and spreading, inner ones clawed; inner segms. sometimes with ligules or scales at base; stamens 6, attached in base of perianth, anthers dorsifixed or basifixed; ovary inferior, superior or semi-superior, 3-celled, the ovules many; stigmas 3 or style 3-parted: fr. a berry or caps. to which the remains of the perianth is more or less adherent.—A marked exception in habit and certain other characters is *Tillandsia usneoides*, L. (*Dendropogon usneoides*, Raf.), the Spanish or Tree Moss, growing on trees from Va. to Fla., Tex. and S., the long soft gray shreds hanging from branches, the fls. inconspicuous.

In choice hothouse collections, several kinds of bromeliads, not described

here, may be expected, grown for their stiff formal clustered foliage and showy fls. or colored bracts. Species of *Pitcairnia* may be found: ovary nearly superior: fr. a dehiscent caps.: lvs. prickly-margined or entire, usually long and slender: fls. red, yellow, or nearly white, long-tubular, in a long spike, raceme or panicle. Certain kinds of *Aregelia* are sometimes cult.: much like *Canistrum* and *Nidularium*, differing from the former (like *Nidularium*) in the tubular inner segms. (petals), without ligules, and from the latter in the simple rather compound infl. The species are often named in *Nidularium*, *Karatas* and *Billbergia*. Of the genus *Bromelia*, very few are cult.: fls. paniculate; outer segms. very narrow and free, not awned, the inner connate only at base and without ligules: lvs. mostly long and stout, spiny margins strong.

- A. Ovary superior or nearly so: fr. a dehiscent caps.
  - B. Lvs. spinose on margin. . . . . 1. PUYA
  - BB. Lvs. not spinose.
    - c. Inner segms. (petals) free (not joined).
      - D. Ligules or scales not present at base of segms. inside. . . . . 2. TILLANDSIA
      - DD. Ligules present at base of segms. . . . . 3. VRIESIA
    - CC. Inner segms. connate or closely connivent. . . . . 4. GUZMANIA
- AA. Ovary inferior: fr. a berry.
  - B. Infl. on a prominent scape or st., not closely surrounded by a rosette or involucre of reduced lvs.
    - c. Fr. (berries), bracts, and rachis growing together to form a solid body or multiple fr. . . . . 5. ANANAS
    - CC. Fr. free, not growing fast with bracts to the rachis or core.
      - D. Fl.-bracts and outer segms. usually mucronate or long-awned; inner segms. mostly not much longer than outer. . . . . 6. ÆCHMEA
      - DD. Fl.-bracts and outer segms. not mucronate or awned; inner segms. much exceeding outer ones. . . . . 7. BILLBERGIA
  - BB. Infl. close among the lvs. or surrounded by an involucre-like rosette of reduced often colored lvs.
    - c. Inner segms. (petals) without ligules, connate at base.
      - D. Outer segms. (sepals) united in a tube. . . . . 8. CRYPTANTHUS
      - DD. Outer segms. free. . . . . 9. NIDULARIUM
    - CC. Inner segms. ligulate, mostly free. . . . . 10. CANISTRUM

1. *PUYA*, Molina. Forty to 50 species of stout stiff xerophytic terrestrial monocarpic herbs of S. Amer., very few grown under glass.—Mostly with trunk or st.: lvs. in dense rosette, usually spiny at tip and on margins, glabrous, or scaly on back: fls. bisexual, often very showy, blue, purple, or yellow, in a spike or raceme; segms. all free and usually nearly or quite equal; ovary completely superior, style slender, 3 stigmas becoming twisted: caps. ellipsoid or nearly globose, fleshy, dehiscent into 6 valves or parts. (Puy-a: Chilean name.)

*P. chilensis*, Molina (*Pitcairnia chilensis*, Lodd. *Pourretia chilensis*, Hort.). Strong plant, growing 4–5 ft. high or more: lvs. 2–4 ft. long, very narrow, glaucous, recurved, the margins strongly armed: fls. greenish-yellow, 2 in. across, sessile or nearly so, in a tall branching bracted infl. Chile.

2. *TILLANDSIA*, L. Species 250, more or less, widely spread in trop. and subtrop. Amer., epiphytic or sometimes terrestrial, a few of them choice glasshouse subjects.—Herbs, caulescent or acaulescent, of diverse habit: lvs. basal, or a few smaller ones on the scape, crowded or in rosette, dilated and sometimes distended at base, margins entire: scape simple or branched (rarely almost wanting), bearing few or many fls., the bracts often colored but usually not broad or strongly distichous; fls. blue, purple, red, orange, or white, the segms. without ligules or scales at base inside; ovary superior: caps. oblong or prismatic, septicidal. (*Tillandsia*-ia: Elias Tillands, Sweden, made catalogue of the plants of Abo in 1673.)

- Stamens shorter than inner segms. . . . . 1. *T. Lindeniana*
- Stamens longer than inner segms. . . . . 2. *T. fasciculata*

1. *T. Lindeniana*, Regel (*T. Lindeni*, Morr. *Vriesia Lindeni*, Lem. *Phytarrhiza Lindeni*, Morr.). Epiphyte, acaulescent: lvs. rosulate, about 1 ft. long,  $\frac{1}{2}$ –

$\frac{3}{4}$  in. broad, dilated at base, recurving: spike large, with carmine bracts; fls. bluish-purple, large, much projecting beyond the bracts. Ecuador, Peru.

2. *T. fasciculata*, Sw. Tall and strong, with rosettes of grayish-green linear-lanceolate lvs. 1-1½ ft. long and expanded at base, more or less scurfy: scape exceeding foliage, branched, the parts of the panicle with distichous keeled acute greenish red-tinged bracts; fls. blue, narrow and exserted. W. Indies, Cent. Amer.

3. *VRIESIA*, Lindl. Eighty to 90 species, mostly epiphytic, monocarpic, with very showy large-bracted spikes.—Lvs. in dense rosette, rather broad, scurfy or becoming glabrous above, not spinose, sometimes spotted, barred, or striped: fls. bisexual, in mostly flattened spikes with highly colored large bracts; segms. free, usually equal, with a ligule or scale at base of segms. inside and in this character differing from *Tillandsia*, yellow, greenish, white or rose-color, covered and sometimes concealed by the bracts; ovary superior or semi-superior: caps. septicidally dehiscent from base. (*Vriesia*: Dr. W. H. de Vries, botanist of Amsterdam, middle of 19th century.)

Infl. simple.....1. *V. splendens*  
Infl. branched.....2. *V. Saundersi*

1. *V. splendens*, Lem. (*V. speciosa*, Hook.). Stout plant to 3 ft. tall: lvs. 1 ft. or more long and 2-3 in. broad, stiff, concave above, arching, transversely irregularly banded with dark brown (whence the garden names *V.* or *Tillandsia zebrina* and *picta*): st. or scape equaling or exceeding foliage, spotted, with spike of densely imbricated bright red bracts: fls. yellowish-white, exserted from bracts. Guiana.

2. *V. Saundersi*, Morr. (*Tillandsia Saundersi*, C. Koch. *Encholirion Saundersi*, André). Plant about 1½ ft. high: lvs. many, linear, grayish and somewhat white-dotted above, spotted red-brown beneath: infl. loosely paniculate, the bracts ovate-elliptic; fls. nearly erect, yellow, cylindrical. Brazil.

4. *GUZMANIA*, Ruiz & Pav. Probably 75 species in trop. Amer., monocarpic, terrestrial or epiphytic, one not uncommon in glasshouses.—Much like the stiff-leaved tillandsias, differing in the inner segms. and usually also the outer ones connate or connivent into a tube, and from *Vriesia* in having all segms. without ligules inside: ovary superior: acaulescent or rarely caulescent herbs, with scurfy lvs. in dense rosette, the scape short and borne amongst the foliage: fls. yellow or white. (*Guzmania*: A. Guzmán, Spanish naturalist.)

Outer segms. exceeding the inner.....1. *G. musaica*  
Outer segms. shorter than inner.....2. *G. lingulata*

1. *G. musaica*, Mez (*Tillandsia musaica*, Lind. *Billbergia musaica*, Regel. *Vriesia musaica*, Cogn. & March. *Caraguata musaica*, André. *Massangea musaica*, Morr.). Terrestrial or rarely epiphytic, stemless: lvs. 12-20 in. long, 2-3 in. broad, rounded at end, strongly decurved, prominently marked with transverse wavy lines that are dark green on the upper surface and purple on the back: infl. 3-4 in. long, short-peduncled, bracts golden-yellow striped rose; fls. 2 in. or less long, yellowish; outer segms. corolla-like and exceeding the inner. Colombia.

2. *G. lingulata*, Mez (*Caraguata lingulata*, Lindl.). Stout-stemmed epiphyte: lvs. many, lanceolate or sword-shaped, 1-1½ ft. long, about 1 in. broad, remotely toothed: scape bearing a drooping terminal dense head or spike with showy red bracts; fls. about as long as the bracts, tube yellowish and limb purplish, outer segms. small and not corolla-like. Trop. Amer.

5. *ANANAS*, L. One monocarpic polymorphic species (or several segregates), native in trop. Amer., widely cult. in warm and trop. countries for the edible head of fr., and some forms for ornament.—Terrestrial, with rosettes of long and strong spiny-serrate lvs., and mostly elongated leafy st. bearing a very dense head at top, the head crowned with a tuft of lvs.: fls. sessile, violet or reddish, bisexual, the segms. free but connivent and tube-like, the inner ones (petals) provided with 2 ligules at the base, the outer (calyx) very short; ovary inferior, style filiform, 3-branched: fr. a syncarpium, formed of the coalescence of thickened rachis, spiny-toothed bracts, abortive ovaries and

adhering parts into one large globose, ovoid or elongated fleshy body known as a "pineapple"; in the wild the coalescence is less complete, and regular fls. may be produced. (Anan-as: modified from aboriginal S. American name.)

**A. comosus**, Merr. (*A. sativus*, Schult. f.). PINEAPPLE. St. single, erect, 2-4 ft. high, bearing the pineapple, suckers arising from the base: lvs. long and sword-shaped, with saw-toothed edges.—The species runs into many forms; some of them have striped or margined lvs. (as var. *variegatus* and that known as *A. Porteanus*, Koch) and are grown for ornament. In the cult. pineapple, the edible part is mostly the greatly thickened pulpy rachis or st.; in this the frs. (berries) are imbedded. These frs., spirally arranged, form the exterior; beneath each fr. is the enlarged jagged-edged bract with its point extended over the fr. and sometimes split by the expansion. The fls. are sterile; but the sharp point of the berry is comprised of the 6 modified segms., one series of 3 inside the other; the cavity underneath the segms. contains the dried remains of the functionless stamens and style.

6. **ÆCHMEA**, Ruiz & Pav. Large genus, of more than 100 species, mostly S. American, monocarpic, usually epiphytic, a few of which are sometimes grown under glass for ornament.—Stemless: scape usually conspicuous, only rarely short and in the nest of foliage: lvs. in a rosette, dilated at base, mostly scurfy, linear to sword-shaped but sometimes broader, acute or rounded at apex, margins variously spinose: fls. mostly yellow or in shades of red, often blue-tipped, sessile or less commonly pedicillate, the bracts sometimes colored and forming the conspicuous part; outer segms. (sepals) free or connate, mostly sharp or long-awned; inner segms. (petals) free to base, with 2 ligules at base of each; ovary inferior, style shorter than stamens, stigma with 3 narrow lobes: fr. a berry or berry-like, many-seeded. (Æchme-a: from Greek word, referring to the pointed sepals.)

Infl. simple, spicate or capitate throughout.

Outer segms. (sepals) united above the ovary.....1. *Æ. Ortgiesii*

Outer segms. free or nearly so.....2. *Æ. Mariæ-Reginæ*

Infl. paniculate, at least at base.

Fl.-bracts minute or none.

Apex of infl. simple and long-spicate.....3. *Æ. fulgens*

Apex of infl. composite.....4. *Æ. miniata*

Fl.-bracts prominent and distichous, somewhat exceeding calyx.....5. *Æ. polystachya*

1. **Æ. Ortgiesii**, Baker (*Ortgiesia tillandsioides*, Regel). Small plant, only a few in. high: lvs. many, densely rosulate, narrow-linear, 10-12 in. long and  $\frac{3}{4}$  in. broad, thick in texture, margins spinulose, much expanded and vaginate at base: infl. glabrous, short, bracts equaling the sepals; fls. red, with straw-colored sharp-serrate bracts; inner segms. erect, somewhat less than 1 in. long, the ligules fimbriate; stamens distinctly shorter than inner segms. (Bears the name of E. Ortgies.) Brazil.

2. **Æ. Mariæ-Reginæ**, Wendl. Strong plant with many strap-shaped prickly margined lvs. 2-3 ft. long and 2-3 in. broad, plain green, scurfy: infl. a dense spike 3-6 in. long, with minute red bracts, the stiff scape or peduncle 1 ft. high; outer segms. and ovary  $\frac{1}{2}$  in. long, mucronate; inner segms. exceeding outer, violet at tip, the spike brilliant with long reflexed crimson bract-lvs. Costa Rica; the "flower of St. Mary" (flor de Santa Maria).

3. **Æ. fulgens**, Brongn. Lvs. many, densely rosulate, dilated at base, 12-16 in. long and 2-3 in. broad, with small distant teeth: infl. equaling or exceeding lvs., branched below and simple above; inner segms. about  $\frac{1}{2}$  in. long, red and blue-tipped, the inner segms. about half as long and blue-violet, ligules serrate, the fl.-bracts minute or none. Brazil.—Var. **discolor**, Brongn. (*Æ. discolor*, Hook.), has lvs. brownish-red or violet-red beneath and usually faintly striped.

4. **Æ. miniata**, Baker. Lvs. with close-set teeth: infl. much exceeding lvs., many-fl., branched throughout and red; inner segms. blue, ovary red, ligules crenate-dentate, bracts minute or none. Brazil.—Likely to be cult. as *Æ. fulgens*. Var. **discolor**, Baker, has lvs. suffused purple or violet-brown on back.

5. **Æ. polystachya**, Mez (*Æ. brasiliensis*, Regel. *Æ. Glaziovii*, Baker. *Tillandsia polystachya*, Vell., not L.). Lvs. several to many, linear-lanceolate above expanded base,  $1\frac{1}{2}$ -2 ft. long, 1-1 $\frac{1}{2}$  in. broad, spinulose on margins, spine-pointed at apex: fls. many in flattened spikes in an erect panicle, the bracts nearly orbicular and many-veined; fls. violet, the inner segms. exceeding the outer, ligules obscurely crenate. Brazil.



7. **BILLBERGIA**, Thunb. Thirty to 40 monocarpic mostly epiphytic plants, usually larger than æchmeas and tillandsias, several of which are in cult.—Stemless: lvs. rosulate or fasciculate, usually scurfy, in most species with spinulose margins: infl. a prominent spike or spicate panicle, erect or drooping, sometimes slender, bracts often prominent and colored; fls. showy, blue, seldom red or greenish-yellow, segms. free to base, the outer ones (sepals) obtuse or rarely only mucronate; ligules 2 at base of each inner segm., cut or fimbriate; ovary inferior, style exceeding stamens, stigma 3-parted: fr. a berry, many-seeded. (Billberg-ia: J. G. Billberg, Swedish botanist, wrote on Scandinavian plants in 1822.)

Inner segms. (petals) curling or twisting spirally after fl. expands.....1. *B. zebrina*

Inner segms. not spiral.

Infl. manifestly nodding.

Lvs. linear: fls. few.....2. *B. nutans*

Lvs.  $1\frac{1}{2}$  in. and more broad: fls. many.....3. *B. Morelii*

Infl. erect or essentially so.....4. *B. Liboniana*

1. **B. zebrina**, Lindl. St. short or none: lvs. few in a rosette, connivent or close together in lower part, strap-shaped, 2-3 ft. long and 2-3 in. broad, hard and stiff, edges prickly, with white spots and transverse bands: scape cernuous, shorter than lvs., with long pink or salmon bracts toward the top, rachis of spike and ovaries white-scurfy: fls. green or yellow-green, inner segms. 2 in. long. Brazil.

2. **B. nutans**, Wendl. Slender plant with many rosulate linear lvs. about  $\frac{1}{2}$  in. broad and 12-18 in. long, not stiff, the teeth very small and remote: scape 1 ft. long, slender, curving over at end, with narrow bright red bracts; fls. 4-8, the segms. green and blue-edged; inner segms.  $1\frac{1}{2}$  in. long. Brazil. —Probably the commonest species.

3. **B. Morelii**, Brongn. Lvs. several in rosette, sword-shaped, 2 ft. or less long and  $1\frac{1}{2}$ -2 in. broad, connivent below, hard, finely spinose on margin, not banded: scape 1 ft. long, with long red very showy bract-like lvs. near and in the loose drooping ovate scurfy spike; fls. reddish in outer segms., blue-limbed in inner segms. (For M. Morel, Paris, who first flowered it.) Brazil.

4. **B. Liboniana**, De Jonghe. Rather small: lvs. few in a rosette, connivent below, sword-shaped, 2 ft. or less long and  $1-1\frac{1}{2}$  in. broad, firm but not hard, minutely spinulose-toothed, not marked or banded: scape 1 ft. long, slender, with small and inconspicuous bracts throughout, the fls. 6-10 in an erect or nearly erect simple spike; outer segms. bright red, 1 in. long; inner green with blue tips, twice as long. (Introduced to Eu. about 1850 by M. Libon.) Brazil.

8. **CRYPTANTHUS**, Klotzsch. About a dozen epiphytes of S. Amer., one or two in common cult. under glass for the foliage.—Stemless, stoloniferous, much depressed or flattened herbs, with densely rosulate spreading stiff lvs. finely or rather coarsely prickly on the margins: fls. white, in a head nested in the foliage; outer segms. (sepals) connate into a tube, not mucronate or awned, inner segms. longer, little united at base, wide-spreading in anthesis, without ligules; stamens inserted on corolla, filaments slender; ovary inferior, with many ovules in each cell; style filiform, stigmas very narrow: fr. berry-like but dry, the seeds very small. (Cryptan-thus: Greek *hidden flower*.)

Lvs. cross-banded.....1. *C. zonatus*

Lvs. plain, not banded.....2. *C. acaulis*

1. **C. zonatus**, Beer (*Tillandsia zonata*, Hort.). Lvs. several to many, 5-9 in. long,  $1-1\frac{1}{2}$  in. broad, crinkly, transversely banded above with whitish and green or brown, white-scurfy beneath, margin thickly set with spinulose small teeth, apex short-acute: fls. in a small central sessile head or cluster; outer segms. (calyx)  $\frac{1}{2}$  in. long; inner segms. oblanceolate, about 1 in. long. Brazil.

2. **C. acaulis**, Beer (*C. undulatus*, Otto & Dietr. *Tillandsia acaulis*, Lindl.). Lvs. several to many, 3-6 in. long and  $1-1\frac{1}{2}$  in. broad, prominently undulate, plain green above and white-scurfy beneath, margins finely spinulose-dentate: fls. in a close short cluster; outer segms. (calyx)  $1\frac{1}{2}$  in. long; inner segms. clawed, about 1 in. long. Brazil.



9. **NIDULARIUM**, Lem. Fifteen to 20 Brazilian monocarpic epiphytes, sometimes cult. for the foliage and showy bracts.—Lvs. mostly large, in a dense rosette, the base dilated but otherwise sword-shaped, strap-shaped or linear, prickly on margin: scape very short, the composite infl. sessile in a crater-like or nest-like rosette of lvs. which, variously modified, form a kind of involucre: fls. red, purplish or white; outer segms. (sepals) free; inner segms. connate at base forming a tube, without ligules; ovary inferior, style filiform and about equaling anthers, stigma 3-parted: fr. a many-seeded berry. (*Nidularium*: Latin *nidus*, nest, from the habit.)—The name *Karatas* was formerly used for this genus.

**N. fulgens**, Lem. (*N. pictum*, Hort.). Stemless: lvs. many in a dense rosette, strap-shaped, spreading, 1 ft. or less long,  $1\frac{1}{2}$  2 in. broad, green with usually darker spots, scurfy on back, sharply toothed, cuspidate or obtuse at tip: fls. many in a close cluster among the brilliant scarlet inner short lvs., the ovary white, long tube of inner segms. white and limb violet.

10. **CANISTRUM**, Morr. About 10 Brazilian species, epiphytic or terrestrial, monocarpic, sometimes grown under glass.—Lvs. in a dense rosette, expanded and vaginate at base, linear or sword-shaped above, spinulose on margin, more or less scurfy: scape either short or tall, the simple spike or head dense and subtended by a separate whorl of broad colored bracts; fls. usually green, sometimes yellow or blue; segms. mostly free to base but sometimes connate and the outer ones (sepals) awned, the inner ones with 2 ligules which are cut or nearly plumose or in some cases represented by calluses; ovary inferior, style filiform and about equaling stamens; stigma 3-parted: fr. a many-seeded more or less succulent berry. (*Canis-trum*: Greek for *basket*, probably alluding to the cup-like whorl of bracts.)

Inner segms. (petals) free to base.....1. *C. aurantiacum*  
Inner segms. connate.....2. *C. amazonicum*

1. **C. aurantiacum**, Morr. (*Echmea aurantiaca*, Baker). Vigorous: lvs. many in a rosette, spreading and curving from near the bottom, 1-2 ft. long and about 2 in. broad, expanded at base, uniform green or at first spotted dark green, with small marginal teeth: scape erect, hidden in the greenish cup of lvs. and bracts, the innermost of which are bright red; fls. in dense head, orange-yellow, about 2 in. long.

2. **C. amazonicum**, Mez (*Nidularium amazonicum*, Lind. & André. *Karatas amazonica*, Baker). Stemless and stoloniferous: lvs. many in the rosette, lanceolate, 12-18 in. long and 2-3 in. broad, brownish but not spotted or banded, the teeth very small: scape short, bearing a dense head that has lanceolate short bracts; fls. greenish-white, tube of inner segms. as long as calyx.

## 22. COMMELINACEÆ. SPIDERWORT FAMILY

Annual or perennial herbs, of 26 genera and about 300 species, widely distributed in trop. and sub trop. regions.—Sts. knotty and leafy: lvs. alternate, entire, ovate-lanceolate or linear, vaginate or amplexicaul: fls. bisexual, almost regular; sepals 3 or parts slightly connate, green; petals 3, free or united into a tube, alternating with sepals, colored, withering; stamens usually 6, in 2 whorls, sometimes 3, often some reduced to staminodia, filaments often hairy; style 1, stigma simple or obscurely 2-3-lobed; ovary superior, 2-3-celled, with few or many ovules: fr. a caps.

Fertile stamens 2-3, sterile 0-4.....1. *COMMELINA*  
Fertile stamens 6, rarely 5.  
Petals grown into tube.....2. *ZEBRINA*  
Petals free or nearly so.  
Cells of ovary with 3 or more ovules.....3. *DICHORISANDRA*  
Cells of ovary with 2 ovules.....4. *TRADESCANTIA*  
Cells of ovary with 1 ovule.....5. *RHEO*

1. **COMMELINA**, L. DAY-FLOWER. About 100 species, two of which are grown out-of-doors or in pots; some of the native species may also be intro-

duced as ground-cover.—Peduncles solitary or clustered, subtended below by a large foliaceous spathe-like bract; fls. irregular; sepals 3, colored, sometimes connate, persistent; petals 3, free, the 2 inner ones often long-clawed, blue or yellow, rarely white, withering; stamens 6, only 3 being fertile, filaments glabrous; ovary sessile, 2-3-celled, dorsal cell 1-ovuled, ventral cells 1-2-ovuled: fr. usually a 3-celled caps. (Commelina: after Kaspar (1667-1731) and Johann (1629-1698) Commelin, Dutch botanists.)

Plant erect.....1. *C. cælestis*  
Plant diffuse, branching.....2. *C. tuberosa*

1. *C. cælestis*, Willd. Roots fibrous or tuberous; plant erect: lvs. oblong-lanceolate, minutely scabrous or glabrous: spathes pubescent, round or cordate at base, wavy-margined: upper racemes 4-10-fl., lower 1-2-fl., hairy; 2 inner sepals slightly connate; petals deep blue. Mex.—There are vars. with white and blue-and-white fls.

2. *C. tuberosum*, L. Roots tuberous; plant diffuse and branching: lvs. narrow-lanceolate, margins often hairy: spathes hairy or almost glabrous, cordate-ovate and lanceolate: racemes 6-10-fl.; 2 inner sepals slightly connate; petals blue. Mex.

2. **ZEBRINA**, Schnizl. Two species in Mex., New Mex., and Tex.—Decumbent or pendulous herbs, sparingly hairy: lvs. ovate or oblong, base vaginate: fls. clustered, almost sessile, between 2 conduplicate bracts; sepals and petals united into a tube, the limb ovate or lanceolate, blue-purple; stamens 6, equal, inserted at throat of tubular corolla; ovary 3-celled with 2 ovules in each cell. (Zebri-na: referring to the striped lvs.)

**Z. pendula**, Schnizl. (*Tradescantia zebrina*, Hort. *T. tricolor*, Hort., in part. *Commelina zebrina*, Hort.). WANDERING JEW (in part). Decumbent, branched: lvs. ovate-oblong, acute to acuminate or somewhat obtuse, pubescent or glabrous beneath, striped white and green above, purple below; sheaths hairy at top and bottom: infl. between 2 sessile lvs., one much smaller than other; calyx-tube whitish; corolla-tube white, segms. red-purple; style filiform, stigma capitate, 3-lobed. Mex.—Var. *quadricolor*, Bailey (forma *quadricolor*, Voss. *Tradescantia quadricolor* and *T. multicolor*, Hort.), has lvs. with metallic-green undertone, striped with green, red, and white.

3. **DICHORISANDRA**, Mikan. Nearly 30 species in trop. Amer., two of which are grown in greenhouses or out-of-doors in the S.—Perennial with erect or partially scandent sts.: lvs. sheathing at nodes: infl. racemose-paniculate, racemes solitary; pedicels subtended by bract; sepals 3, free, unequal, green or colored, persistent; petals 3, free, with short claws, blue or purple; stamens 6 or 5, equal, filaments short, naked; ovary sessile, 3-celled with 4-5, rarely 2-3, ovules in each cell: fr. an ovate 3-angled caps. (Dichorisan-dra: Greek, referring either to the 2 series of stamens or the 2-valved anthers.)

Lvs. not variegated.....1. *D. thyrsiflora*  
Lvs. variegated.....2. *D. mosaica*

1. *D. thyrsiflora*, Mikan. From 3-4 ft. high: lvs. large, lanceolate, narrowed into distinct petiole, glabrous, shining green; sheaths glabrous or minutely pubescent: fls. in dense racemes, dark or light blue; sepals glabrous; anthers bright yellow. Brazil.

2. *D. mosaica*, Lind. Lvs. large, broadly elliptic, rounded at base, sessile, glabrous, striped longitudinally above and along transverse veins with green and white: racemes short, densely thyrsoid; sepals corolla-like, white; petals blue. Peru.—Var. *gigantea*, Hort., is a large-fl. form. Var. *undata*, W. Miller (*D. undata* C. Koch & Lind.), has foliage without mosaic, the variegation being only longitudinal.

4. **TRADESCANTIA**, L. SPIDERWORT. More than 30 species, one of which is a common greenhouse and basket plant and another, *T. virginiana*, a hardy border subject.—Lvs. various: peduncles solitary, fascicled, or rarely paniculate; fls. in umbels, rarely solitary; umbels sessile or pedunculate; sepals 3, free, green or colored, persistent; petals 3, free, somewhat orbicular, blue,

red-purple, or white; stamens 6, free, hypogynous, all fertile, filaments naked or hairy; ovary sessile, 3-celled with 2 ovules in each cell. (Tradescantia: for John Tradescant, gardener to Charles I, who died about 1638.)

Plant prostrate.....1. *T. fluminensis*  
Plant erect.....2. *T. virginiana*

1. *T. fluminensis*, Vell. (*T. tricolor*, Hort., in part). WANDERING JEW (in part). Sts. prostrate, rooting at nodes: lvs. oblong or ovate-oblong, acute, glabrous, sheaths hairy at top: umbels many-fld., subtended by 2 broad-lanceolate bracts much exceeding the pedicels; petals white; filaments hairy. Brazil, Uruguay, Paraguay.—Common under benches in greenhouses.

2. *T. virginiana*, L. COMMON SPIDERWORT. Erect, glabrous or slightly hairy: lvs. linear, to 15 in. long: umbels terminal, many-fld., subtended by linear-lanceolate bracts, 2-8 in. long; pedicels and sepals villous; petals violet-purple; filaments hairy. N. Y. to S. D., Va., and Ark., and escaped further north.—White, red, blue, and double-fld. forms are offered in the trade. Some of the stock known as *T. virginiana* is *T. reflexa*, Raf., native O. west and south: the herbage is glaucous; sepals glabrous except usually for a tuft of hairs at tip of one or more sepals.

5. *RHÆO*, Hance. One species from Mex. and W. Indies, cult. in greenhouses.—Lvs. densely imbricated, narrow-lanceolate, base vaginate: peduncles axillary, sometimes divided; fls. many in a dense umbel, inclosed by 2 boat-shaped bracts; sepals 3, ovate-lanceolate, withering; petals 3, ovate, withering; stamens 6, hypogynous, fertile, filaments hairy; ovary sessile, 3-celled with 1 ovule in each cell. (Rhæ-o: name obscure.)

*R. discolor*, Hance (*Tradescantia discolor*, L'Her.), is a short-stemmed low herb with white fls. and lvs. purplish underneath. Var. *vittata*, Hook. (*Tradescantia variegata*, Hort.), is the common form in cult., with lvs. purple beneath and above striped longitudinally with pale yellow.

### 23. PONTEDERIACEÆ. PICKEREL-WEED FAMILY

Aquatic herbs, erect or floating, of 6 genera and about 20 species in the swamps of the warmer parts of the earth, except Eu., one of which is common in ponds and tanks.—Lvs. fluitant and long-petioled or blade floating or sometimes emersed, variously dilated or rarely narrow, those on flowering branches short-petioled, sometimes submerged lvs. reduced to form of petioles: infl. usually spike-like, without bracts; fls. bisexual, more or less irregular; perianth of 6 parts, in 2 series, free from ovary, persistent; stamens 3 or 6, on tube or base of perianth; ovary superior, 3-celled with axillary placentæ or 1-celled with 3 parietal placentæ, style 1, stigma entire or 3-parted: fr. a caps. or achene.

**EICHHORNIA**, Kunth. (*Piaropus*, Raf.). About 6 species in S. Amer., one reaching trop. Afr.—Plant floating, rooting at nodes: floating or emersed lvs. obovate, cordate or rarely lanceolate: fls. spicate or rarely paniculate; perianth funnel-shaped with long or short tube; stamens 6, unequally inserted on tube, some of them exserted; ovary sessile, 3-celled, with numerous ovules; style filiform. (Eichhornia: J. A. F. Eichhorn, Prussian minister, born 1779.)

Petioles inflated.....1. *E. crassipes*  
Petioles not inflated.....2. *E. azurea*

1. *E. crassipes*, Solms. WATER-HYACINTH. Floating or rooting in mud: lvs. erect,  $\frac{1}{2}$ -5 in. broad, ovate to orbicular, glabrous, slightly scarious above; petioles much inflated at base: scape simple, with conspicuous sheath near middle; spikes many-fld., 6-lobed, violet, upper lobe larger with patch of blue having yellow spot in center. Trop. and subtrop. Amer.; naturalized in Fla. where it obstructs navigation by choking the rivers and streams.—Var. *major*, Hort., has rosy-lilac fls.

2. *E. azurea*, Kunth. Lvs. variable in size and shape, usually very broad-ovate to orbicular, glabrous; petioles not inflated: scapes gradually dilated into a hooded spathe; fls. scattered or crowded in pairs along a hairy rachis, lavender-blue with rich purple center; inner segms. toothed. Brazil.

## 24. JUNCACEÆ. RUSH FAMILY

Seven or 8 genera and 200–300 species of low rush-like or grass-like mostly not showy or prominent herbs in many parts of the world, usually of moist and boggy places; some of them may be transferred to bog-gardens, but only one appears to be regularly in cult.—Fls. bisexual, small, aggregated into glomerules or panicles, the perianth-parts greenish and chaff-like; sepals and petals each 3; stamens 3 or 6; ovary 3-celled or with 3 parietal placenta, bearing 3 stigmas: fr. a dry several- to many-seeded caps.: lvs. radical or cauline, or both.

**JUNCUS**, L. RUSH. Mostly humble smooth perennials: sts. terete or flattened, hollow or pithy, with bare or foliaceous sheaths: caps. perfectly or imperfectly 3-celled, containing seeds mostly ribbed or reticulated and sometimes caudate: infl. glomerate or paniculate, often lateral near top of the st. (Jun-cus: classical Latin name.)

**J. effusus**, L. (*J. communis*, Hort.). Common rush in low pastures in north temp. zone and Patagonia, growing in tough clumps: sts. soft and cord-like, erect, 2–4 ft.; basal sheaths leafless: fls. in a cluster at top of scape, appearing lateral because of the extended involucre lf.—Occurs in many forms. Var. **vittatus**, Buchenau, has foliage striped yellow; var. **spiralis**, Hort., has spirally twisted sts.

## 25. LILIACEÆ. LILY FAMILY

A large family of wide distribution over the earth, most abundant in temp. and subtemp. regions, comprising some of the choicest ornamental plants; species of *Asparagus* and *Allium* are also extensively grown for food. Species exceeding 2,000, in more than 200 genera, perennial (rarely annual), dying down after flowering to a bulb, bulb-like organ, or to a crown of fleshy root-stocks, and a few of them (as the dracenas and yuccas) woody and sometimes tree-like; certain species are climbers; a number yield medicine, and some of them have poisonous properties. A large part of the florists' "bulbs" are of this family.—Fls. mostly showy and with colored parts, sometimes small and greenish but then usually many in racemes, spikes, or panicles, the perianth typically of 6 distinct parts or gamophyllous and 6-lobed, commonly all the parts petal-like; ovary single and usually distinctly superior, mostly 3-celled, maturing into a dehiscent caps. or a berry, mostly many-seeded; stamens chiefly 6 but sometimes 3, 1 before each part or lobe of the perianth, hypogynous or sometimes attached on the perianth, the anthers 2-celled: fls. not in spathe, except in the *Allium* series; perianth-segms. sometimes differentiated to represent calyx and corolla. The prevailing corolla-like 6-merous hypogynous fls. (superior ovary) are distinctive marks of the Liliaceæ, although in *Ophiopogon* (sometimes referred to *Hæmodoraceæ* but very closely related to the free-ovaryed *Liriope*) the ovary is wholly or partly inferior. (Compare *A* and *F* in Fig. 8.) In a few genera (as the native *Maianthemum* and forms of *Aspidistra*) the perianth is 4-merous. *A*, *B*, *C*, *D*, Fig. 8.

Aside from the more usual plants described in the following treatment, certain other liliaceous plants are likely to be found in choice collections:

**ERYTHRONIUM dens-canis**, L., DOGS-TOOTH VIOLET, of Eu. and Asia, is sometimes planted in rockeries and borders: spring-blooming little bulbous plant with radical lvs. patched or blotched with reddish-brown, the blade 2–3 in. long, elliptic or oval, acute or acuminate: fls. drooping, single on a scape 3–6 in. high, rose-colored or purple, segms. reflexed. The native *Erythroniums* are sometimes taken to cult. grounds.

**EUCOMIS punctata**, L'Her., PINEAPPLE-FLOWER, of S. Afr., of the *Scilla* tribe: bulbous: lvs. narrow, in a radical cluster, spotted beneath: fls. on a scape 1 ft. high, greenish, ½ in. long, the raceme or spike topped by a tuft of bracts.





FIG. 8. LILIES AND AMARYLLIDS.

A, *Lilium longiflorum*, showing the ovary (dotted lines) inside the perianth and superior. B, Tulip, showing the superior ovary, 6 stamens and 6 perianth parts. Bb, pistil removed, and also cut across to show the 3 cells. C, Lily-of-the-Valley; Cc, longitudinal section of flower showing superior ovary and 4 of the 6 stamens. D, *Ornithogalum umbellatum*. Dd, separate flower. Ddd, details of stamens and stigma. E, *Narcissus*, showing inferior ovary at E, also the corona. F, *Hippeastrum* (Amaryllidaceæ), showing inferior ovary at F. G, *Zephyranthes*, with inferior ovary. H, Iris; 1, standards, below which, on either side, are the falls (above 5); 2, crest of stigma; 3, claw; 4, beard; 5, spathe, within which is the inferior ovary. Hh, style-branch from the under side, showing crest at apex, stigma at 2; underneath is a stamen, 3.

**LAPAGERIA rosea**, Ruiz & Pav., a choice tall vine from S. Chile, is sometimes grown in the cool greenhouse: lvs. alternate, coriaceous, ovate-acuminate, short-petioled, 3-ribbed: fls. showy, trumpet-shaped, 3-4 in. long, the segms. distinct, rose-colored, with white and crimson var.

**PUSCHKINIA scilloides**, Adams, is a scilla-like little plant from W. Asia, differing from Scilla in the staminal tube: fls. few on a scape 1 ft. or less tall, bluish. Var. **libanotica**, Boiss., has staminal tube or corona with acute bifid teeth, whereas *P. scilloides* has truncate or retuse teeth and smaller fls.

**REINECKEA carnea**, Kunth, a single species from Japan and China, is a useful low tufted rhizomatous plant with grass-like lvs. and a scape a few inches high bearing raceme of flesh-colored sessile fls.

**SCHIZOBASOPSIS volubilis**, Macbride (*Bowiea volubilis*, Harvey), an odd plant from S. Afr., may be grown under glass for interest or demonstration to students in botany. It produces a great bulb or tuber in the ground, with fugacious scales at the top representing lvs.; annually it sends up a long twining green st. that performs the functions of foliage and bears small greenish fls.

**SMILAX officinalis**, HBK., is sometimes grown in collections of economic plants, under glass at the N.; it is one of the species of Smilax yielding sarsaparilla. It is a very tall strong-growing tendril-climber with large coriaceous oblong-ovate parallel-ribbed lvs. and globular clusters of fls. on axillary peduncles. Other species of Smilax may be similarly grown; and the native species are collected for winter green and are sometimes transferred to planted grounds. Florists' smilax is *Asparagus asparagoides*, page 166.

**URGINEA Scilla**, Steinh. (*U. maritima*, Baker), yields the squills of apothecaries, from the large bulbs; it is known as SEA-ONION, native in Eu. and Afr., sometimes cult. Lvs. radical, narrow, glaucous: fls.  $\frac{1}{2}$  in. across, whitish, on a scape 1-3 ft. high, appearing before the foliage.

- A. Plant bulbous—producing 1 or more scaly bulbs (or sheath-covered corms) underground at base of st.: scapose, or else st. not branched from the base: fr. capsular (dry pod): all except the onion plants grown for showy fls., constituting the true lily tribes; the following species herbaceous and erect (not climbing): lilies, spring "bulbs," and similar plants.
- B. Species with leafy sts., often branched toward the top (in Tulipa lvs. often reduced to 1 or 2, rarely to bracts).
- C. Anthers attached to filament at the middle of back, versatile... 1. LILIUM
- CC. Anthers attached at base, erect.
- D. Outer segms. of perianth like the inner ones, or only slightly different.
- E. Fls. nodding or pendulous; segms. with nectar-bearing pit or spot..... 2. FRITILLARIA
- EE. Fls. usually erect; segms. without pit..... 3. TULIPA
- DD. Outer segms. smaller and sepal-like..... 4. CALOCHORTUS
- BB. Species with scapes rather than leafy sts. (when apparently leafy, as in Galtonia, the lvs. are really basal and ensheath the scape; or, as sometimes in Allium, the lvs. are more truly cauline).
- C. Fls. (or clusters) issuing from 1 or more prominent membranaceous bracts or spathes, that may fall at anthesis or remain on the scape.
- D. Perianth gamophyllous, with distinct tube that equals or is less in length than the lobes..... 5. BRODIAEA
- DD. Perianth of separate parts, or only connate at base..... 6. ALLIUM
- CC. Fls. (or clusters) not from involucre spathes (small bracts sometimes subtend individual fls. but these are not spathes).
- D. Scape very short, not appearing above ground.
- E. Perianth tubular; 3 styles distinct to base..... 7. COLCHICUM
- EE. Perianth-parts distinct but claws connivent to form tube; style 3-parted..... 8. BULBOCODIUM
- DD. Scape evident, usually prominent above ground.
- E. Segms. distinct or essentially so. (No. 12 may be sought here.)
- F. Filaments flattened; segms. not prominently nerved... 9. ORNITHOGALUM
- FF. Filaments filiform (sometimes flattened at base).
- G. Nerves of segms. 3 to many..... 10. CAMASSIA
- GG. Nerves of segms. 1..... 11. SCILLA
- EE. Segms. united, i.e. perianth tubular or gamophyllous below. (No. 12 sometimes exceptional.)
- F. Perianth tubular, not constricted, the parts sometimes free nearly or quite to the base..... 12. LACHENALIA
- FF. Perianth urn-shaped (in ours), constricted at the throat..... 13. MUSCARI

# LILIACEÆ

- FFF. Perianth funnellform or narrowly bell-shaped, flaring at top.
  - g. Base of perianth swollen: raceme short, small-bracted.....14. HYACINTHUS
  - gg. Base of perianth not swollen or gibbous: raceme tall, large-bracted.....15. GALTONIA
- FFFF. Perianth broadly bell-shaped, open: plant small, few-fl'd.....16. CHIONODOXA
- AA. Plant not bulbous or cormous—producing a rootstock or thickened often tuberous more or less branching underground parts: fr. capsular or baccate: plants grown either for fls. or for foliage, of various habit, sometimes climbing, mostly branching.
  - B. Lvs. thick, stiff, pulpy and succulent.....17. ALOE
  - BB. Lvs. otherwise, not prominently succulent.
    - c. Green foliage represented by lf.-like branches either expanded and lf.-like or needle-like (cladodes) borne in the axils of little dry scales (true lvs.).
      - d. Fls. from axils of the little scales; anthers 6.....18. ASPARAGUS
    - DD. Fls. borne on the midrib of expanded cladode (or "leaf"); anthers 3.....19. RUSCUS
  - CC. Green foliage of the ordinary kind, of true lvs. not borne in the axils of scales.
    - D. Anther splitting on the side facing outward (extrorse).
      - E. Fls. large and lily-like, not clustered: plant climbing.....20. GLORIOSA
    - EE. Fls. small, in axillary or terminal clusters: plant erect.....21. TRICYRTIS
  - DD. Anther splitting on the side facing inward (introrse).
    - E. Infl. issuing from a papery spathe (which soon falls).....22. AGAPANTHUS
  - EE. Infl. not from an involucrate spathe.
    - F. Lf.-blades broad and stiff, not long-pointed nor narrowed as if to petiole, forming an erect clump, grown for foliage.
      - G. Fls. on slender open racemes not exceeding the lvs.....23. SANSEVIERIA
    - GG. Fls. compacted on a short radical spadix-like spike.....24. ROHDEA
  - FF. Lf.-blades expanded, elliptical, ovate or broader, narrowed into petiole-like base.
    - G. Fls. small, white, on raceme among or under the lvs.....25. CONVALLARIA
    - GG. Fls. about 1 in. across, purple, borne at surface of ground.....26. ASPIDISTRA
    - GGG. Fls. larger (1½-5 in. long), blue or white, on a stout bracted scape.....27. HOSTA
  - FFF. Lf.-blades linear or sword-shaped, long, usually long-pointed, not narrowed into a petiole-like part.
    - G. Fls. large and lily-like, not racemose or spicate, yellow or orange, on tall sts. or scapes.....28. HEMEROCALLIS
    - GG. Fls. otherwise, not large and lily-like and usually not in the yellow series, racemose or spicate.
      - H. Perianth-segms. usually distinct, or connate only at very base.
        - I. Lvs. stiff and sword-like, long-pointed. (No. 35 may be sought here.)
          - J. Fl. open, with spreading segms.....29. YUCCA
          - JJ. Fl. with segms. somewhat incurved.....30. PHORMIUM
        - II. Lvs. grass-like, usually equaling or exceeding the slender small-fl'd. scapes.
          - J. Ovary superior.....31. LIRIOPE
          - JJ. Ovary inferior.....32. OPHIOPOGON
      - III. Lvs. various, in basal clumps (also cauline in Nos. 17 and 38), not stiff and sword-like nor narrow, thin and grass-like.
        - J. Fls. reflexed in dense spikes on tall scapes....33. KNIPHOFIA
        - JJ. Fls. erect or pendulous, not or scarcely reflexed, in open racemes.
          - K. Attachment of anthers at back, versatile.
            - L. Scape leafless.....34. ASPHODELUS
            - LL. Scape or st. leafy.....35. ASPHODELINE
      - KK. Attachment of anthers at base, erect.
        - L. Stamens shorter than perianth.
          - M. Color of fls. red.....17. ALOE
          - MM. Color not red.
            - N. Caps. little if at all angled: ours without runners.....36. ANTHERICUM
            - NN. Caps. strongly 3-angled: plant (in ours) strongly stoloniferous.....37. CHLOROPHYTUM
          - LL. Stamens equaling or exceeding the perianth.....38. EREMURUS
    - HH. Perianth tubular to bell-shaped or funnellform, gamophyllous.
      - I. Plant low and slender, scapose, lvs. narrow...39. PARADISEA

- ii. Plant big and tall, producing a caudex or trunk but under glass grown mostly as acaulescent tub subjects for the foliage.
  - j. Pedicels usually 2 or more together, without involucre bracts at base.....40. DRACÆNA
  - jj. Pedicels solitary, 3 bracts at base forming a kind of involucre.....41. CORDYLINE

1. **LILIUM**, **L. LILY**. Attractive plants of the north temp. zone, probably less than 100 species; several species are common in gardens, and others appear in choice collections.—Perennial erect leafy-stemmed herbs, with underground scaly bulbs: fls. pendulous, inclined, horizontal or erect, solitary or clustered, with 6 separate segms. which are scarcely differentiated as between sepal-like and petal-like organs, each bearing a nectar-groove or -furrow at base; stamens 6, hypogynous or slightly adherent to perianth, mostly shorter than the segms., the anthers versatile, filaments very slender; pistil 1, with long style and 3-lobed stigma: fr. a dry loculicidal many-seeded caps. (*Lil-ium*: the Latin name; the Greek word is *lirion*, used in the naming of some of the subdivisions of the genus.)

Several native lilies more or less grown are not sufficiently established or modified to be regarded as hort. subjects. The commoner of the eastern species to be found in nurseries and gardens are: **L. philadelphicum**, L., **WOOD LILY**, fls. 1-5, erect, 3-4 in. across, open-bell-shaped, the segms. long-clawed, flaring at top, orange-red: st. 1-3 ft. tall, whorled. **L. canadense**, L., **MEADOW LILY**, fls. hanging, few to several, 2-3 in. across, wide-bell-shaped, dark yellow, orange-yellow to red, the segms. widely spreading or the upper half recurved, spotted inside: lvs. mostly whorled but more or less scattered above and below, somewhat rough on the veins beneath. **L. superbum**, L., **AMERICAN TURKS-CAP LILY**, fls. hanging, few to several or many, 3-4 in. across, wide open, orange-scarlet to red, the segms. strongly recurved from near the base, spotted and shaded: lvs. mostly whorled, smooth below. **L. Grayi**, S. Wats., **GRAYS LILY**, is a slender species on the mts. of Va. and N. C., with 1-3 small spreading or declined, red or tinged yellow thickly spotted fls., the segms. not clawed and little spreading: lvs. mostly whorled, rough on the veins beneath. Bears the name of Asa Gray (1810-1888), great American botanist.

- A. Fls. erect, open bell-shaped, the segms. usually clawed and wide-spreading but scarcely reflexed; stamens spreading away on all sides from the nearly or quite straight style. (**ISOLIRION**.)
  - B. Style longer than ovary.
    - c. Pedicels erect, straight.
      - d. Lvs. 5-7-nerved,  $\frac{1}{2}$  in. or more broad..... 1. *L. elegans*
      - dd. Lvs. 3-nerved, linear..... 2. *L. dauricum*
    - cc. Pedicels curved outward, mostly divaricate..... 3. *L. croceum*
  - BB. Style not exceeding ovary, usually much shorter..... 4. *L. concolor*
- AA. Fls. horizontal, or nearly so, trumpet-shaped with a tube (mostly long) formed by the connivent segms. which are spreading only above the middle; stamens parallel with the style, slightly curved. (**EULIRION**.)
  - B. Tube of perianth slender, little widening from base to middle.
    - c. Color of fls. white..... 5. *L. longiflorum*
    - cc. Color or fls. tinted or darker, sometimes on white ground.
      - d. Bulblets in upper axils..... 6. *L. Sargentix*
      - dd. Bulblets absent..... 7. *L. regale*
  - BB. Tube markedly widening upward, or short.
    - c. Lvs. scattered.
      - d. Color of fls. white..... 8. *L. candidum*
      - dd. Color of fls. tinged purple or brown..... 9. *L. Brownii*
    - DDD. Color of fls. rose, pink, varying to bluish-white.
      - e. Anthers red: fls. 5-7 in. long..... 10. *L. japonicum*
      - ee. Anthers yellow to orange: fls. 3-4 in. long..... 11. *L. rubellum*
    - cc. Lvs. whorled..... 12. *L. Washingtonianum*
- AAA. Fls. horizontal or declined (sometimes becoming nearly pendulous), wide open without tube; segms. broadest at base or below the middle, papillose inside, widely spreading; stamens diverging from style. (**ARCHELIRION**.)



- B. Lvs. mostly broad or rather broad, short-petioled.
- c. Color of fls. orange-yellow.....13. *L. Henryi*
- cc. Color white with broad yellow stripe along midrib.....14. *L. auratum*
- ccc. Color white tinged rose-pink.....15. *L. speciosum*
- BB. Lvs. long and narrow, sessile.....16. *L. tigrinum*
- AAAA. Fls. pendulous, wide open, not tubular; segms. broadest at middle, usually not or lightly papillose, strongly recurved; stamens diverging from style. (MARTAGON.)
- B. Foliage whorled.
- c. Color of fls. purple (a white var.).....17. *L. Martagon*
- cc. Color of fls. on yellow order.
- d. Segms. yellow at base, orange-scarlet at top, reflexed to pedicel.....18. *L. pardalinum*
- dd. Segms. golden- or orange-yellow to orange-red, less reflexed.
- e. Perianth 4-5 in. across.....19. *L. Humboldtii*
- ee. Perianth less than 3 in. across.....20. *L. Hansonii*
- BB. Foliage scattered.
- c. Lvs. many-nerved, mostly lanceolate; fls. yellow.....21. *L. monadelphum*
- cc. Lvs. 1- or few-nerved, usually narrow-linear.
- d. Color of fls. yellow.
- e. Perianth not spotted, or sometimes lightly dotted red.....22. *L. testaceum*
- ee. Perianth spotted purple.....23. *L. Leichtlinii*
- dd. Color red or orange-red.
- e. Segms. of perianth broad (usually more than  $\frac{1}{2}$  in. broad at middle).
- f. St. whitish-puberulent, faintly spotted.....24. *L. Maximowiczii*
- ff. St. glabrous or nearly so, much spotted.....25. *L. warleyense*
- ee. Segms. narrow (usually less than  $\frac{1}{2}$  in. broad).
- f. Width of lvs. up to  $\frac{1}{2}$  in.
- g. Perianth mostly exceeding 2 in. across; segms. slightly dotted.....26. *L. chalconicum*
- cg. Perianth smaller; segms. strongly dotted.....27. *L. pomponium*
- ff. Width of lvs.  $\frac{1}{6}$  in. or less.....28. *L. tenuifolium*

1. *L. elegans*, Thunb. (*L. Thunbergianum*, Schultes). Popular early-flowering lily: st. 1-1½ ft. high, glabrous or lightly pilose: lvs. many, scattered, narrow-lanceolate, glabrous, 5-7-nerved, 3-4 in. long and ½-1 in. wide at the middle: fls. erect and terminal, 1-3 or 4, orange-red slightly spotted with black-purple, spreading widely, 4-6 in. across and usually not so high; segms. oblong-spatulate, 1 in. or more broad, spreading in upper half, not reflexed. Japan.—Grown under many forms and names, varying in stature, size of lvs., and color of fls., as well as in season of bloom; some of the forms may be hybrids.

2. *L. dauricum*, Ker (sometimes erroneously spelled *davuricum*). Usually somewhat taller than No. 1, with linear 3-nerved lvs.: fls. smaller, red, prominently spotted, the segms. oblong-lanceolate, 1 in. or less broad. Siberia.

3. *L. croceum*, Chaix. Hardy, vigorous, early-flowering, 3-6 ft.: st. finely spotted purple below and usually more or less white-pubescent above (at least in infl.): lvs. numerous, scattered, linear to lance-linear to narrow-lanceolate, 3-5-nerved: fls. erect in a candelabrum, the lower pedicels close together and curving strongly outward and upward and equaling or exceeding the perianth, the upper pedicels shorter and more erect; perianth bell-shaped, 2½-3 in. high, orange with crimson spots and lines, sometimes pubescent outside; segms. not recurved, oblong-lanceolate to spatulate, narrowed below. Mts. of S. Eu.

4. *L. concolor*, Salisb. Mid-early-flowering, small: st. 12-18 in. high, purplish: lvs. scattered, lanceolate, about 7-nerved, somewhat ciliate on margin: fls. few, erect, 1½-2½ in. long, crimson and nearly or quite free of spots, paler outside; segms. flaring, lanceolate, ½-½½ in. wide at middle; style short. China, Japan.

5. *L. longiflorum*, Thunb. WHITE TRUMPET LILY. The most popular of lilies for greenhouse growing, and frequently planted in the open: st. 1½-3 ft., smooth, green and unspotted, reddish toward base: lvs. many, scattered, long narrow-lanceolate, acuminate, smooth, finely nerved: fls. few to several, horizontal or somewhat inclined or declined, clear waxy white, green-tinged toward base, long-tubular, 4-7 in. long, the upper part flaring like a trumpet and 4-5 in. across, very flangeant; segms. oblanceolate, obtuse, 1-1½ in. broad toward top; style long and slender, curving upward. Japan.—There are many forms in cult. Var. *eximium*, Nichols. (*L. eximium*, Court. *L. Harrisii*, Carr.), is a large vigorous-growing race, known as EASTER LILY and BERMUDA LILY, formerly much grown under glass.

6. *L. Sargentiae*, Wils. (*L. leucanthum* var. *Sargentiae*, Stapf). Showy and desirable summer-blooming species: st. 4-8 ft., smooth, purplish, with bubbllets in upper lf.-axils: lvs. very many, scattered, lanceolate (½ in. or more wide): fls. mostly few,

sometimes several, 5-6 in. long and opening nearly as wide, waxy white inside with tinge of yellow at throat, reddish-purple outside, fragrant. (Named in compliment to Mrs. Charles Sprague Sargent.) W. China.

7. *L. regale*, Wils. (*L. myriophyllum*, Hort., not Franch.). Hardy graceful very showy summer-blooming lily: st. 4-6 ft., slender, smooth, purplish with dark spot at lf.-attachment: lvs. very many, linear ( $\frac{1}{2}$  in. or less wide), long-pointed, without bulbils: fls. few to several, nearly horizontal, 4-6 in. long, the segms. opening widely and somewhat recurved, fragrant, white inside but yellowish deep in the tube, outside light lilac and purple, the ribs strongly colored. W. China.

8. *L. candidum*, L. MADONNA LILY. The commonest hardy outdoor white lily, also forced, early-blooming: st. 2-4 ft., smooth, green: radical lvs. appearing in autumn and persisting over winter, long-oblancoelate, 8-10 in. long, strongly 3-nerved, shining; st.-lvs. many, scattered, the lower ones oblanceolate, the upper ones becoming short narrow-lanceolate to nearly linear and long-pointed: fls. several to many in a rather close erect raceme, horizontal or somewhat declined, 2-3 in. long, bell-shaped or broad-funnelform with short tube, clear waxy-white, the obovate segms. somewhat recurved; style very long. S. Eu. to S. W. Asia.—There are double-fl. and lf.-margined vars.

9. *L. Brownii*, F. E. Brown. Vigorous very showy summer-bloomer: st. 2-4 ft., smooth, more or less tinged and spotted brown: lvs. many, scattered, lanceolate to elliptic-lanceolate, narrowed both ways, strongly pointed, prominently about 5-nerved: fls. 1, 3, or 4, nearly horizontal, 6-8 or 9 in. long, tubular part comprising about one-third the length, fragrant, body color creamy-white with brown backs outside; segms. oblanceolate, obtuse, flaring or somewhat recurved at top; style very long. (Made known to commerce by Messrs. Brown, Windsor, England.) China.

10. *L. japonicum*, Thunb. (*L. Krameri*, Hook. f.). Handsome species, rather difficult to maintain: st. 2-3 ft., smooth, more or less purple tinged and dotted: lvs. scattered, long (5 in. or more), narrow-lanceolate: fls. 1 or 2, or sometimes more, 5-6 or 7 in. long and nearly as wide, fragrant, rose-pink inside and out, varying in intensity and sometimes bluish-white; anthers red. Japan.

11. *L. rubellum*, Baker. Much like No. 10, of better constitution: low (1-2 ft.): lvs. shorter: fls. smaller (3-4 in. long), fragrant, light red but variable; anthers yellow or orange. Japan.

12. *L. Washingtonianum*, Kellogg. WASHINGTON LILY. Beautiful species, not fully hardy in northern states: st. 3-6 ft., smooth: lvs. whorled, 6-12 together, lanceolate, glaucous-green: fls. several to a score, 2-4 in. long, very fragrant, pure white with purple dots, becoming purplish with age, narrow-campanulate in shape; segms. spreading at top and not connivent in tube. Sierra Nevada and N.; known as Lady Washington lily before it was described botanically.

13. *L. Henryi*, Baker. Hardy good lily, summer-blooming: st. 4 ft. or more, smooth, purple-spotted: lvs. many, crowded, scattered, elliptic-lanceolate to ovate-lanceolate, narrowed to a short petiole-like base, many-nerved, 2-5 or 6 in. long, the upper ones passing into broad-ovate short pointed bracts about 1 in. long: fls. several to many, on long wide-spreading bracted pedicels, more or less nodding, not fragrant, orange-yellow; segms. brown-spotted, papillose and greenish toward base, narrow and separate and much spreading or recurved; style long and straight, about the length of stamens. (Henryi: Augustine Henry, Ireland, collector in China.) China.

14. *L. auratum*, Lindl. GOLDEN-BANDED LILY. One of the handsomest of the lilies, summer- and autumn-blooming: st. 3-5 or 6 ft., smooth, glaucous, more or less purple-tinged: lvs. many, scattered, strongly nerved, ovate-lanceolate (4-6 in. long and 1 in. and more wide) and distinctly petioled, in other forms linear-lanceolate: fls. several in a terminal open panicle-like raceme, horizontal or drooping with weight, 6-10 or even 12 in. across, wide-bell-shaped, fragrant, white much spotted crimson, each segm. with a longitudinal yellow band; segms. elliptic, wide-spreading, the tips recurved, inner ones papillose toward base; style long and slender. Japan.—Runs into several color-forms.

15. *L. speciosum*, Thunb. Hardy showy and adaptable lily, summer and autumn: st. usually 2-3 ft., small, often purplish: lvs. scattered and not crowded, oblong-lanceolate, 4-6 in. long, many-nerved, rather abruptly contracted into an appressed petiole, acuminate: fls. several on long divaricate bracted pedicels, declined or drooping, fragrant, 3-5 or 6 in. diam., white overlaid with rose-pink and bearing rose-purple elevated spots; segms. broad-lanceolate, bearded, reflexed from near the base; anthers cinnamon-brown; style long, equaling the stamens.

Japan.—Variable, with many named forms, as var. *Melpomene*, Hort., with deeper colored fls. with white-edged segms.; var. *magnificum*, Hort., large in all its parts and early-blooming; also color-forms.

16. *L. tigrinum*, Ker. TIGER LILY. Old lily common about yards and sometimes escaped: st. 2-4 ft., purplish or brown, with cobwebby covering: lvs. many, crowded, 4-6 in. long, straight or curved, linear to lance-linear with expanded more or less clasping base, many-nerved, bulblets in the axils: fls. few to many in a terminal panicle-like raceme on stout spreading pedicels, drooping, open and spreading without tube, orange-red or salmon-red with many purple-black spots; segms., lanceolate, reflexed disclosing the long style and stamens. China, Japan.—Several cultural races are recognized, one double-fl'd.

17. *L. Martagon*, L. MARTAGON or TURKS-CAP LILY. An old hardy garden species, early summer: st. 3-6 ft., glabrous or toward the top puberulous, sometimes spotted purple: lvs. in whorls of 6-9, scattered above and seldom throughout, oblanceolate or spatulate, sessile, finely veined: fls. several to many, hanging on divaricate pedicels in a long panicle-like terminal raceme, 2-3 in. across and not so high, dull purple or purplish-red with many purplish-black spots, with disagreeable odor; segms. lanceolate, pubescent on back, papillose on margins at base, reflexed to the pedicel; anthers red. (Martagon is a special form of turban.) S. Eu. to Japan.—There are several cult. vars., one with white fls. and yellow anthers, another double.

18. *L. pardalinum*, Kellogg. LEOPARD LILY. Frequent in cult., midsummer, with bulb-bearing branching rootstock, forming mats: st. 3-6 ft., glabrous, green: lvs. in whorls of 9 or more, or fewer above, sometimes scattered, linear-lanceolate to oblanceolate: fls. few to many, usually whorled below and racemose above, hanging on long spreading pedicels, 2-4 in. diam.; segms. lanceolate, yellow at base and orange-scarlet above, purple-spotted toward base, reflexed to the pedicel; anthers red. Coast Ranges and Sierra Nevadas in Calif.

19. *L. Humboldtii*, Roetzl & Leicht. Stately species, midsummer: st. 3-6 ft., very stout, glabrous or slightly pubescent: lvs. in whorls of 10-15, oblanceolate, glaucous: fls. few to many, large (4-5 in. across), orange-yellow to orange-red spotted purple-brown or maroon, hanging; segms. oblong-lanceolate, recurved but not reflexed to pedicel; anthers red. (Discovered in 1869, the centenary of the birth of Alexander Von Humboldt.) Sierra Nevada Mts., Calif., north of Yosemite.

20. *L. Hansonii*, Leicht. JAPANESE TURKS-CAP LILY. Spring and early summer: st. 3-4 ft., slender, glabrous: lvs. in whorls of 8-12, oblanceolate, the whorls few and other lvs. scattered: fls. few to several in lax raceme, somewhat fragrant, drooping, 1-2½ in. across, bright golden-yellow spotted purplish-brown; segms. thick, waxy in texture, lanceolate, revolute; anthers orange-red. (Bears the name of an American amateur of lilies.) Japan.

21. *L. monadelphum*, Marsh. & Bieb. Stately spring and early summer lily: st. 3-6 ft., stout, somewhat pubescent: lvs. many, scattered, linear-lanceolate, lanceolate to oblanceolate: fls. usually several to many in tall terminal panicle-like raceme, 3-5 in. across, golden-yellow sometimes tinged purple, spots slight or absent, odor not pleasant; segms. waxy, oblanceolate, reflexed; filaments sometimes coherent or monadelphous at base; anthers greenish or orange. Caucasus and Persia.

22. *L. testaceum*, Lindl. NANKEEN LILY. Hardy graceful lily, early summer: st. 4-6 or 7 ft., brown-tinted, lightly pubescent: lvs. many, scattered, linear: fls. few to several, umbellate or racemose, nodding, fragrant, 2-3 in. and more across, apricot or nankeen-yellow often flushed pink and rarely slightly dotted; segms. reflexed to the pedicel, lightly papillose at base; anthers red. Japan; perhaps of hybrid origin.

23. *L. Leichtlinii*, Hook. f. Summer-blooming: st. 2-4 ft., erect from a subterranean repent base, indistinctly puberulent, shaded dark brown: lvs. many, scattered, linear: fls. few, sometimes several, nodding, 3-4 in. across, lemon-yellow spotted dark purple; segms. lanceolate, purplish outside, reflexed to the pedicel; anthers reddish-brown. (Named for Max Leichtlin, noted cultivator of Carlsruhe, Germany.) Japan.

24. *L. Maximowiczii*, Regel (*L. pseudo-tigrinum*, Carr.). Summer to autumn: st. erect, not from a creeping base, 3-5 ft., whitish-puberulent, faintly spotted: lvs. many, scattered, linear: fls. few or several, 3-4 in. across, salmon-red spotted purple, segms. ovate-lanceolate, ¾ or more in. broad, papillose at base, reflexed to pedicel; anthers red. (Named for C. J. Maximowicz, 1827-1891, eminent Russian botanist.) China, Japan; perhaps hybrid, with *L. Leichtlinii* and *L. tigrinum* possible parents.

25. *L. warleyense*, Willm. (*L. Willmottiiæ*, Wils.). Strong, 3-4 ft., glabrous or essentially so, spotted red-purple, without bulbils: lvs. many, spirally scattered, 4 or 5 in. long, mostly less than  $\frac{1}{4}$  in. broad, linear or nearly so, lighter-colored beneath: fls. 3-25 or more on horizontal or declined pedicels 4 in. long with a narrow bract near the middle, orange-red and dark-spotted, hanging,  $2\frac{1}{2}$ -3 in. across, not fragrant; segms. oblong-lanceolate to narrowly ovate-lanceolate, about  $\frac{3}{4}$  in. broad at middle, papillose near base and the nectary prominent, reflexed to the st. China; grown at Warley Place, near London, and exhibited by Miss Ellen Willmott.

26. *L. chalcedonicum*, L. SCARLET TURKS-CAP LILY. Old hardy garden species, summer-blooming: st. 3-4 ft., slightly pubescent, tinted purple: lvs. very many, scattered, lower ones oblanceolate, central and upper ones linear: fls. few or several, pendulous, odor not agreeable, 2-3 in. diam., vermilion-scarlet seldom slightly dotted; segms. oblanceolate,  $\frac{1}{2}$  in. or less broad, thick and waxy, papillose at base, reflexed to pedicel; anthers scarlet. Greece and adjacent isls., but named for Chalcedon farther east.

27. *L. pomponium*, L. MINOR TURKS-CAP LILY. Small graceful species, early summer: st.  $1\frac{1}{2}$ -3 ft., stout, furrowed: lvs. very many, scattered, narrow-linear: fls. few to several, pendulous, 2 in. or less across, brilliant scarlet dotted purplish-black, with offensive odor; segms. oblanceolate,  $\frac{1}{2}$  in. or less broad, reflexed to the pedicel forming a little ball or pompon; anthers scarlet. S. France, N. Italy.

28. *L. tenuifolium*, Fisch. Graceful bright-fld. lily with grass-like foliage, early blooming: st. slender, 1-2 ft., glabrous: lvs. many, scattered, very narrow-linear or almost capillary: fls. few to several on slender remote pedicels, drooping,  $1\frac{1}{4}$ -2 in. across, brilliant scarlet seldom slightly dotted; segms. oblong-lanceolate,  $\frac{1}{4}$ - $\frac{3}{8}$  in. broad, reflexed to the pedicel; anthers red. Siberia, China.

2. FRITILLARIA, L. FRITILLARY. Probably 60 to 70 species in the north temp. zone, many of them showy and interesting as hort. subjects, but only two often seen in American gardens; some are native in N. Amer.—Mostly low early-blooming bulbous plants with simple sts. and hanging lily-like fls. in which the anthers are basifixed and the segms. of perianth provided at base with nectar-bearing cavities or spots: segms. 6, all alike or similar; stamens 6, about equaling the 3-parted or undivided style: fr. a loculicidal 3-celled caps., with many seeds. (*Fritillaria*: Latin *fritillus*, dice-box, probably in allusion to the square markings on fls. of some species.)

Fls. terminating the st. .... 1. *F. meleagris*  
Fls. underneath a crown of fls. .... 2. *F. imperialis*

1. *F. meleagris*, L. SNAKES-HEAD. CHECKERED-LILY. St. erect, 12-18 in., glabrous: lvs. few, linear to oblong-lanceolate, with semi-clasping base, 4-6 in. long: fl. normally 1 but sometimes 2 or 3 in. cult., hanging, short open-bell-shaped, 2-3 in. across, checkered and veined with purplish or maroon on a paler ground (cult. forms with white and yellowish fls.); segms. oblong, obtuse. Spring. England and continental Eu. to S. W. Asia.

2. *F. imperialis*, L. (*Imperialis coronata*, Dum.-Cours). CROWN IMPERIAL. Striking, stout and erect, spotted purple on st. above, 2-4 ft., with strong odor, from large bulb: lvs. many, scattered, ascending, lanceolate, often more than 1 in. wide, glabrous: fls. several hanging on curved pedicels under a crown or whorl of lvs. that stands well above the other foliage, purplish, brick-red or yellow-red, with large nectar-drops in bottom; segms.  $1\frac{1}{2}$ -2 in. long, oblong to oblanceolate, veiny; 3-parted style eventually protruding. Persia.

3. TULIPA, L. TULIP. Species 50 to 60 or more in the Medit. region and across Asia to Japan, low spring-blooming plants of much beauty; the common garden tulips are considered to be referable to two species (Nos. 1 and 2), but other species are sometimes grown as "botanical tulips."—Bulb tunicated, mostly tapering upward: st. simple (in some species branched), scape-like but lf.-bearing, 6-30 in. high, glabrous and glaucous or sometimes pilose or scabrous: lvs. largely radical, in the garden forms broad and thick and more or less glaucous: fls. mostly erect, bell-shaped to saucer-shaped; segms. 6, distinct, without nectaries; stamens 6, hypogynous, included, anthers basifixed; style wanting in the garden forms: fr. a loculicidal caps. with many seeds. (Tu-lipa: from oriental word for turban.)—Fls. in solid colors are "selfs" or



"breeders"; those with mixed colors are said to be "broken"; when the under color is white and markings lilac or purple, they are "hybloems"; when under color is yellow and markings red to brown, they are "bizarres."

- St. pubescent and somewhat scabrous ..... 1. *T. suaveolens*  
 St. glabrous and perhaps glaucous.  
 Segms. of perianth broad and overlapping, very obtuse. .... 2. *T. Gesneriana*  
 Segms. narrow and long, making a star-like fl., more or less obtuse. 3. *T. Kaufmanniana*  
 Segms. acute, with hirsute claw, the fl. small. .... 4. *T. Clusiana*

1. *T. suaveolens*, Roth. DUC VAN THOL TULIP. Very early: st. 4-6 or 8 in., pubescent and scabrous, at least above: lvs. 3 or 4 at base of st., long-lanceolate, glaucous, more or less pubescent on upper surface: fl. 1, fragrant, about 2 in. high, scarlet, yellow or variegated; segms. oblong and acute,  $\frac{3}{4}$  in. or less broad; anthers yellow. S. W. Asia, as in the Caspian region.

2. *T. Gesneriana*, L. COMMON TULIP. Midseason and late: st. 6-12 in. or more, glabrous and glaucous: lvs. 3 or 4 or more on lower part of st., long broad-lanceolate to ovate-lanceolate, often 3-4 in. broad, glabrous and glaucous: fl. 1, not fragrant, 2 in. and more high, scarlet with black-purple center, often yellow or white; segms. obovate-oblong, obtuse or slightly cuspidate,  $\frac{3}{4}$ -1 in. or more broad; anthers purple or yellow. (Associated with the name of Conrad Gesner, botanist, 1516-1565.) Russia, Asia.—Var. *Dracontia*, Baker. PARROT or DRAGON TULIPS. Segms. deep cut and crisped. Var. *Darwinia*, Bailey. DARWIN TULIPS. Tall, late-flowering, large-leaved: fls. self-colored, deep rich reds, crimsons and purples, the perianth little spreading and remaining cup-shaped. The Rembrandt tulips are of the Darwin class, but with parti-colored fls.

3. *T. Kaufmanniana*, Regel. WATER-LILY TULIP. Very early, low, usually less than 12 in. high: lvs. 2 or 3, very broad: fl. 2-3 in. long, somewhat bell-shaped, with oblong-elliptic usually obtuse segms. that usually do not make a continuous deep cup, wide open and becoming reflexed, bright yellow tinged red but in cult. from cream-white to pale pink and rosy purple, sometimes blotched in center. (Named in honor of Gen. Von Kaufmann, Governor-General of the province in which the plant was discovered.) Turkestan.

4. *T. Clusiana*, Vent. LADY TULIP. Later, 12-18 in., with 4 or 5 linear folded long-acuminate lvs.: fl. rather small, about 2 in. across, narrow bell-shaped, very fragrant, with acute segms., white or cream-white, sometimes flushed outside, purplish in center. (Associated with the name of Carolus Clusius, or L'Escluse, botanist, 1526-1609.) Portugal to Persia.

4. CALOCHORTUS, Pursh. GLOBE-TULIP. MARIPOSA- or BUTTERFLY-LILY. Forty or more small cormous plants of W. Amer., some of which are more or less planted.—Plant producing coated corms: st. more or less branched, slender or flexuose, lf.-bearing, a few in. to 3 ft. tall: fls. showy, yellow, white, bluish or lilac, often spotted or marked in center, terminal singly or fascicularly, broadly campanulate, wide open or partially closed, erect or nodding; segms. 6, the 3 inner ones showy and bearing gland or spot at base, the outer ones smaller and sepal-like; stamens 6, the anthers basifixed; stigmas 3, recurved, sessile: fr. a 3-angled or 3-winged mostly septicidal caps. with many flattened seeds. (Calochortus: from Greek words for *beautiful* and *grass*.)

Fls. and caps. erect; perianth open.

- Perianth yellow or orange, without dark eye. .... 1. *C. luteus*  
 Perianth white to lilac, with eye. .... 2. *C. venustus*  
 Fls. and caps. nodding; perianth parts incurved. .... 3. *C. albus*

1. *C. luteus*, Dougl. YELLOW MARIPOSA-LILY. St. sometimes branching, 10 in. or less, bearing bulbs in sheath near base: lvs. linear: outer segms. narrowly ovate-lanceolate, acute, yellowish; inner segms. fan-shaped, 2 in. or less long and as broad, yellow or orange, brown-lined, the gland lunate, densely hairy. Coast Ranges, Calif.

2. *C. venustus*, Dougl. WHITE MARIPOSA-LILY. St. to 10 in. and more, commonly branching, usually with 1 bulblet at base: lvs. linear, glaucous: outer segms. oblong-lanceolate, acuminate; inner segms. broad-cuneate, 1-2 in. long, white or pale lilac with reddish eye-spot and sometimes transversely blotched toward top; gland roundish to oblong, densely hairy. Coast Ranges to Sierra Nevada, Calif.

3. *C. albus*, Dougl. WHITE GLOBE-TULIP. Stout, branching, glaucous, 2 ft. or less: lvs. long-lanceolate: fls. globular, 1 in. across, satiny in texture; outer segms.

short, ovate-acuminate; inner segms. nearly orbicular, somewhat acute, white with purplish base, with long silky hairs; gland lunate, fringed with hairs and bearing 4 scales. Coast Ranges, Calif.

5. **BRODIEÆ**, Sm. About 30 species of low cormous or bulbous plants of W. Amer., several of which are now and then planted, but only one common in cult.—Scapes erect, or long and twining: lvs. radical, few, very narrow: fls. single, umbellate or capitate, on jointed pedicels, from a spathe or involucre scarious bracts, perianth various but mostly funnelform or narrow-campanulate, purple to red, white, and yellow, the parts 6; stamens 6, half of them sometimes represented by staminodia, the filament frequently produced beyond the anther: caps. loculicidal. (Brodieæ-a: James Brodie, Scotch botanist.)

**B. uniflora**, Baker (*Milla uniflora*, Grah. *Triteleia uniflora*, Lindl.). SPRING STAR-FLOWER. Spring-blooming plant with onion-like odor, from small deep-seated bulbs: lvs. nearly flat, slightly glaucous, broad-linear: fl. 1 on a scape 6–8 in. tall, bracted about midway by 2-valved dry spathe,  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. across, salver-shaped, white with bluish tinge, the oblong segms. with darker blue and the under sides ribbed bluish-brown. Argentina.

6. **ALLIUM**, L. ONION. A large genus, probably 300 species, in the northern hemisphere, many of them native in N. Amer., with strong characteristic odor; a very few are grown for ornament and others as vegetable-garden subjects.—Scapose plants with mostly only radical or subbasal lvs. (which, as well as the scape, are often fistulose or hollow), with tunicate bulbs: fls. small, few to many in a terminal umbel, emerging from a scarious 1-, 2- or 3-leaved cap or spathe, white, greenish, yellow, pink or purple, with 6 withering segms. that are distinct or connate at base; stamens 6, usually attached to base of perianth; pistil with 3-celled ovary, slender style and entire or 3-parted stigma: fr. a small loculicidal caps. (Al-lium: Latin name for garlic.)

Plants grown for the ornamental bloom.

Fls. white.....1. *A. neopolitanum*

Fls. yellow.....2. *A. Moly*

Plants grown for food.

Lf. plane, flat or conduplicate.

Bulb of several parts or cloves: plant small.....3. *A. sativum*

Bulb simple, not much enlarged: plant large.....4. *A. Porrum*

Lf. fistulose (cylindrical and hollow).

Species biennial or plur-annual, usually with evident bulb or bulb-like enlargement.

Lvs. large, not numerous.

Bulb little thicker than neck.....5. *A. fistulosum*

Bulb large and prominent.....6. *A. Ceba*

Lvs. small and awl-like.....7. *A. ascalonicum*

Species a tufted perennial growing in mats, without prominent bulbs.....8. *A. Schœnoprassum*

1. **A. neopolitanum**, Cyr. (*A. Hermettii*, Hort.). Grown in the open in mild climates and in pots elsewhere for the showy sometimes fragrant bloom: scape 1–2 ft. high, slender, mostly overtopping the flat basal lvs. (which are sometimes 1 in. broad): fls. many, white with colored stamens, the segms. enlarging and becoming scarious in fr.; pedicels becoming 1– $1\frac{1}{2}$  in. long, upwardly curving. S. Eu., and E.

2. **A. Moly**, L. Planted often in rock-gardens and borders: scape 10–18 in., often more than 1 from the bulb, equaling or exceeding the broad flat not elongated lvs.: fls. bright yellow, in a rather close umbel that becomes somewhat more open in fr.; segms. very acute, becoming papery in fr.; pedicels  $\frac{1}{2}$ –1 in. long. (Moly: ancient name for a plant with marvelous medicinal powers.) S. Eu.

3. **A. sativum**, L. GARLIC. Plant small: bulb with several parts or cloves, all inclosed in a silky white or pink general envelope or skin: lvs. several from base or crown, flat, 1 in. or less wide, long-pointed: scape long and terete, not swollen, exceeding lvs., spathe with point 3–4 in. long; umbels small and dense, with long scarious bracts: fls. often displaced by bulbels, usually sterile, pinkish, exceeded by the slender pedicels, with equal lance-acute segms., anthers and style exserted, ovary oblong-ovoid and emarginate at apex. Eu.; sometimes escaped.

4. **A. Porrum**, L. LEEK. Plant stout and tall, biennial: bulb simple, the first year little broader than the thick neck: scape pithy and not hollow, 2–3 ft.: lvs.

equitant, keeled, the halves flat, 2-3 ft. long and 2 in. or less broad: fls. pinkish, very many in a large dense terminal umbel subtended by single long-pointed spathe; anthers exserted; filaments of 3 stamens with slender branch on either side overtopping anther. (Porrum: Latin word for leek.) Cultigen; probably derived from *A. Ampeloprasum*, L., of Eu. and W. Asia.

5. *A. fistulosum*, L. WELSH ONION. SPRING ONION. Stout, more or less tufted, glaucous, very leafy: scape short and thick, hollow, 12-20 in., swollen in middle, arising from bulbous base little thicker than st. or crown: lvs. fistulose, about equaling scape: fls. white or whitish, in dense terminal umbel, less than  $\frac{1}{2}$  in. long and equaling or exceeding the filaments; segms. acuminate; stamens long-exserted, alternate filaments broadened at base. Asia.—Lvs. used for seasoning.

6. *A. Cepa*, L. ONION. Various in habit, relatively large in bloom, potentially biennial, usually not forming clumps or tufts: bulb large: scape 2-4 ft., hollow, swollen below middle, much taller than lvs.: first-year lvs. radical and basal, hollow, thickest below middle, glaucous: fls. many, lilac or nearly white, in large umbel subtended by 2 or 3 reflexed bracts, the pedicels 1 in. or less long; segms. narrow-lanceolate, acute; stamens exserted, 3 inner filaments expanded at base and lobed or toothed on either side. (*Cepa*: Latin for onion.) W. Asia.—Many garden races. Marked forms are: Var. *solaninum*, Alef. (var. *multiplicans*, Bailey). POTATO and MULTIPLIER ONION. Propagating by natural division or separation of the bulb: scape (infrequently produced) short and few-flid. Var. *viviparum*, Metz. (var. *bulbelliferum*, Bailey). TOP ONION. Underground bulb small and undeveloped: bulbels borne in fl.-cluster (which is often proliferous) and used for propagation.

7. *A. ascalonicum*, L. SHALLOT. From *A. Cepa* differs in small stature, slender awl-like lvs., and small ovate-oblong or somewhat conical gray more or less angular bulbs that break up into distinct parts or bulblets that cohere at base: fls. (usually not produced) white or violet, in globose heads, scarcely exceeding pedicels; segms. oblong-lanceolate, acute. Probably a cultigen, perhaps derived from *A. Cepa*; supposed to be Asian, and it is named for Ascalon, of the E. Medit. region.—Little known in cult.; forms of *A. Cepa* are commonly called shallot in the market.

8. *A. Schœnoprasum*, L. CHIVE. Perennial, forming firm tufts or sods, with tough roots: scape 6-24 in. tall, bulbous-thickened at base: lvs. grass-like, hollow, equaling or surpassing the scape: fls. many in a head, rose-purple; segms. long-acuminate. (The specific name is a Greek substantive compound meaning rush-or reed-leek.) Eu., Asia.

7. *COLCHICUM*, L. Thirty and more species of small cormous plants, mostly autumn-blooming, one frequently planted and others in choice collections; northern hemisphere in Old World.—Scape very short, underground, so that the fls. are stemless: lvs. appearing with fls. or long after them, strap-shaped or linear: fls. crocus-like, purple or white (rarely yellow), long-tubular, segms. 6; stamens 6, inserted in the perianth, the anthers dorsifixed and versatile; pistil with 3-celled ovary and long slender styles separate to base: caps. 3-grooved, septicidal. (Col-chicum: from Colchis, ancient name of a country on the Black Sea.)

C. *autumnale*, L. Corm tunicate: lvs. few, appearing usually in spring, lanceolate, 12 in. or less long and 2 in. or less broad: fls. 1-4 or 6, 3-4 in. across when expanded, appearing in autumn, with slender tubes several inches long that elevate the purple oblong obtuse veined segms. above the ground: caps. arising with foliage in spring. England and continent, N. Afr.—There are white, striped and other color races; also doubles.

8. *BULBOCODIUM*, L. A single variable species in Eu. and Asia, a very early spring-blooming (sometimes autumn- or winter-blooming) small crocus-like plant frequently planted.—Corm tunicate: lvs. few, radical: scape very short, not appearing above ground: fls. funnelform, the 6 slender-clawed segms. distinct; stamens 6, attached in the perianth; pistil with sessile 3-celled ovary and filiform 3-parted style: caps. 3-angled, septicidal. (Bulbocodium: Greek woolly bulb.)

B. *vernum*, L. Lvs. short, narrowly strap-shaped, obtuse or mucicous, arising just after the blossoms: fls. nearly on the ground, appearing in advance of crocus, violet-purple; segms. linear-lanceolate, spotted on claw.

9. **ORNITHOGALUM**, L. Bulbous scapose plants of probably 100 or more species, some of them planted in the open and in pots for the bloom; Old World, where the bulbs of some species are used as food.—Bulb tunicate, often large: scape short or tall, simple: lvs. radical, strap-shaped to linear, few to several from each bulb, sometimes fleshy: fls. several to many in terminal bracted raceme or corymb, sometimes umbel-form, white, yellow, reddish, perianth persistent; segms. distinct, sometimes with green ribs; stamens 6, hypogynous, the filaments usually dilated, anthers dorsifixed; pistil 1, with sessile 3-celled ovary, style short or stout-columnar, with more or less 3-lobed stigma: caps. 3-lobed, loculicidal; seeds few, black or dark-colored. (*Ornithogalum*: Greek *bird's milk*, probably alluding to egg-like color of fls. of some species.)

- Perianth-segms. conspicuously keeled green outside.  
 Fls. corymbose or somewhat umbellate.....1. *O. umbellatum*  
 Fls. long-racemose.  
 Blossoms nodding.....2. *O. nutans*  
 Blossoms erect or ascending.  
 Lvs. narrow,  $\frac{1}{2}$  in. or less broad.....3. *O. pyramidale*  
 Lvs. broad,  $\frac{3}{4}$  in. or more.....4. *O. caudatum*  
 Perianth-segms. self-colored, not green on back.  
 Pistil large and prominent, nearly black.....5. *O. arabicum*  
 Pistil not conspicuous, greenish.....6. *O. thyrsoides*

1. ***O. umbellatum***, L. STAR-OF-BETHLEHEM. Tufted from ovoid bulbs: scape 1 ft. or less high, about equaling the linear lvs.: fls. few to several on long spreading pedicels subtended by pointed relatively short scarious bract, opening in sunshine, 1 in. and more across when open; segms. narrowly oblong-lanceolate, acute, wide-spreading, white inside, green and white-margined outside, much exceeding the stamens; filaments expanded. Medit. region; frequent in yards and also run wild.

2. ***O. nutans***, L. Not tufted: bulb ovoid: scape 1-2 ft., stout: lvs. long-linear, equaling or exceeding scape, disappearing after blooming season: fls. few to several in erect raceme, nodding, on short pedicels subtended by much longer pointed bracts, broadly campanulate and  $1\frac{1}{2}$ -2 in. across; segms. oblong, short-acute or nearly blunt, white inside and green with white margin outside, much exceeding stamens; filaments expanded, 2-toothed at top. Eu., S. W. Asia; in gardens and also escaped.

3. ***O. pyramidale***, L. Bulb ovoid: scape  $1\frac{1}{2}$ -2 ft., usually overtopping the few narrow early-withering linear lvs.: fls. in a long narrow raceme on very slender ascending short-bracted pedicels, nearly or quite 1 in. across; segms. oblong to oblong-linear, nearly or quite acute, wide-spreading, white inside and green-centered outside, thrice exceeding stamens; filaments expanded toward base. S. Eu.

4. ***O. caudatum***, Ait. Bulb very large, ovoid: scape stout, 2-3 ft.: lvs. few, nearly or quite as long as scape, fleshy, strap-shaped, long-taper-pointed (caudate), many-veined,  $1\frac{1}{2}$  in. broad or nearly so toward base: fls. 50 or more in a long raceme, about 1 in. across; bracts narrow, about equaling the older pedicels; segms. oblong, nearly or quite obtuse,  $\frac{1}{2}$  in. long, about the length of the stamens, white with prominent green center; filaments expanded below. S. Afr.

5. ***O. arabicum***, L. Bulb large, ovoid to nearly globular: scape  $1\frac{1}{2}$ -2 ft., strong: lvs. several, nearly or quite as long as scape, glaucous-green, narrowly strap-shaped and long-pointed,  $\frac{3}{4}$ -1 in. broad: fls. several, large and fragrant, showy, white inside and out but with black center due to the large pistil, on slender pedicels (lower ones  $2\frac{1}{2}$ -3 in. long) which exceed the large long-pointed scarious bracts; segms. oblong, about 1 in. long, short-acute, twice or more longer than stamens; filaments somewhat expanded below. Medit. region.

6. ***O. thyrsoides***, Jacq. Bulb large, globose: scape  $1\frac{1}{2}$  ft. or less, rather stout: lvs. few, lanceolate, the largest ones 1-2 in. broad, about length of scape, margin finely ciliate: fls. several to many in a dense raceme, white with brownish-green claws and in some vars. yellow; segms. lanceolate, pointed, spreading,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, twice or more exceeding stamens; filaments somewhat expanded below. S. Afr.

10. **CAMASSIA**, Lindl. (*Quamasia*, Raf.). CAMASS. Five or 6 bulbous scapose plants of temp. N. Amer., all but one western; bulbs eaten by Indians; sometimes planted for the showy fls.—Lvs. linear or lance-linear, radical or



basal: fls. in terminal raceme, blue to purple to almost white, pedicels in axil of conspicuous bract; perianth open to rotate, of 6 narrow distinct nerved segms.; stamens 6, inserted on base of segms., the filaments very slender, anthers versatile; caps. 3-lobed, loculicidal, with several black seeds in each cell. (Camassia: Latinized from *camass* or *quamash*, the Indian name.)

**C. Quamash**, Greene (*C. esculenta*, Lindl., not *Scilla esculenta*, Ker. *Quamasia esculenta*, Raf.). Variable in stature, 1-3 ft., erect, glabrous, from a tunicated bulb: lvs. usually lower than scape,  $\frac{3}{4}$  in. or less broad: fls. 10-40 in a loose raceme, dark blue to almost white, nearly or quite 2 in. across, on pedicels  $\frac{1}{4}$ -1 in. long which are surpassed by the bract and fls.; perianth irregular, 1 segm. standing on one side more or less by itself; segms. 3-5-nerved, somewhat exceeding the stamens. Mont. and Ida. to Calif. and N.—**C. esculenta**, Rob. (*Scilla esculenta*, Ker. *Camassia Fraseri*, Torr. *Quamasia esculenta*, Coville. *Q. hyacinthina* Britt.), of the eastern states, is a smaller plant with light blue smaller fls., segms. 3-nerved, pedicels equaling or exceeding the fls.

**11. SCILLA**, L. **SQUILL**. Species 80 or more, in temp. regions in Old World; several are planted for ornament, mostly for early spring bloom.—Low plants with tunicate bulb and radical mostly very narrow lvs. in nearly all the species appearing with the fls., and simple leafless scape: fls. commonly small, few, several to many in terminal raceme, blue, purple, to white, the perianth campanulate or wide open; segms. 6, 1-nerved, distinct or lightly connate at base, not long persisting; stamens 6, attached in the perianth, anthers dorsifixed, filaments very slender or sometimes somewhat dilated at base; pistil 1, with 3-celled nearly or quite sessile ovary, capitate stigma, and various style: caps. 3-lobed or -angled, with mostly few seeds in each cell. (Scilla: ancient Greek and Latin name.)

- Fls. 50 or more in a dense short racemose spike.....1. *S. peruviana*  
 Fls. usually not exceeding 15.  
 Pedicels without bracts at base or else minute.....2. *S. bifolia*  
 Pedicels with evident bracts.  
 Bracts very small, deltoid.  
 Number of fls. usually 4-6.....3. *S. amana*  
 Number of fls. usually 3 or less.....4. *S. sibirica*  
 Bracts prominent and long-pointed, usually equaling the pedicel.  
 Lvs. narrow-linear: raceme corymbose.....5. *S. verna*  
 Lvs. broad-linear, lanceolate or strap-shaped,  $\frac{1}{2}$  in. or more broad:  
 raceme long or open.  
 Perianth cylindrical or tubular (at least when fls. open) with  
 strongly curved or revolute lobes.....6. *S. nonscripta*  
 Perianth bell-shaped, spreading prominently from at or near  
 the base or at least below the middle, with only flaring or  
 lightly curved lobes.....7. *S. hispanica*

1. ***S. peruviana***, L. Bulb large: scape 4-12 in.: lvs. many, 12 in. or less long, linear-lanceolate, ciliate on margins: fls. purple to reddish or whitish,  $\frac{1}{2}$  in. or less long, 50 or more in a short and compact spicate somewhat lengthening raceme; perianth rotate, the oblong segms. green-striped on back; anthers short. Medit. region; the specific name perpetuates an old misnomer.

2. ***S. bifolia***, L. Small plant, very early: scape 1, 3-6 in. high, almost the length of the mostly 2 (sometimes 3) linear or lance-linear lvs.: fls. 3-12, blue varying to reddish or nearly white, mostly nodding in an open raceme, the lower ones on long slender pedicels; perianth rotate or stellate,  $\frac{1}{2}$  in. or less across; anthers blue. Eu., S. W. Asia.—There are forms with white, rose, and red fls. in cult.

3. ***S. amana***, L. **STAR-HYACINTH**. Early: scapes several, 4-6 in. high, about equaling the long-lanceolate lvs. which are  $\frac{3}{4}$  in. or less broad: fls. several, mostly 4-6, blue to whitish, horizontal or spreading or ascending (scarcely cernuous),  $\frac{3}{4}$  in. or less across; perianth rotate. Germany, N. Italy, and E.

4. ***S. sibirica***, Andr. Early: scapes 1 6 and 3-6 in. high, usually somewhat overtopping the long-lanceolate lvs. which are  $\frac{3}{4}$  in. or less broad and blunt or short-acute: fls. about 3, horizontal or cernuous, deep blue, about  $\frac{1}{2}$  in. across, in a short-pedicelled open raceme; perianth rotate. Russia, S. W. Asia.—There are garden color races.

5. ***S. verna***, Huds. Small and delicate, early: scape 1 or 2, 6 in. or less: lvs. narrow-linear, grass-like, exceeding the scape: fls. several, blue, erect, fragrant, in

short corymb-like raceme; perianth  $\frac{1}{2}$  in. across; bracts mostly equaling or exceeding the pedicels. W. Eu.

6. *S. nonscripta*, Hoffm. & Link (*S. nutans*, Sm. *Endymion nutans*, Dum.). ENGLISH BLUEBELL. Scape 1, about 1 ft. high, exceeding the several to many strap-shaped lvs.: fls. blue, sometimes white, 6–12 or more, nodding in a terminal raceme, bracts 2, about as long as pedicel; perianth cylindrical or tubular when the fls. open but perhaps attaining a bell-form as they spread with age, the segms. revolute at tip; stamens united half-way up perianth. Great Britain and continent.—There are hort. color forms in lilac, pink, and others.

7. *S. hispanica*, Mill. (*S. campanulata*, Ait.). SPANISH BLUEBELL. Scape 1, 10–20 in., about the length of the several or many strap-shaped blunt or short-acute lvs.: fls. blue to rose-purple, usually a dozen or more, ascending or nodding in an open raceme, bracts 2, about as long as pedicel; perianth campanulate to open-campanulate, the parts beginning to flare or spread below the middle and often at or near the base, the segms. flaring or curved but not revolute; all or alternate stamens attached to perianth nearly half-way up. Spain, Portugal.—Color forms in white, flesh-color, and rose. Nos. 6 and 7 are apparently mixed in gardens, bulbs of both being planted together; the narrow fls. of No. 6 are characteristic, but as they begin to pass with age may assume somewhat the broad form of No. 7.

12. **LACHENALIA**, Jacq. CAPE-COWSLIP. Upwards of 40 species of small bulbous scapose plants in S. Afr., two or three frequently grown mostly in pots.—Bulb tunicate: lvs. 1, 2, or several, often spotted: fls. mostly in reds and yellows, small to medium in size, borne in a terminal raceme or spike on single-bracted pedicels, in the following species pendulous; perianth gamophyllous, cylindric; segms. 6, the 3 outer ones often shorter, spreading or nearly erect; stamens 6, attached on the tube, filaments very slender, anthers versatile; pistil 1, with 3-celled ovary, slender style and capitate stigma: caps. more or less 3-angled, loculicidal. (*Lachena-lia*: named for Werner de Lachenal, 1736–1800, professor of botany at Basel.)

Outer segms. much shorter than inner, calyx-like.....1. *L. tricolor*  
Outer segms. about length of inner.....2. *L. pendula*

1. *L. tricolor*, Thunb. Scape 1 ft. or less: lvs. usually 2 to each scape, lanceolate, nearly or quite 1 in. broad, equaling or exceeding infl., often spotted purple or dark green: fls. 3–12 or more, about 1 in. long, pendulous on short pedicels, yellow, red at tip and sometimes at base, the short outer segms. tipped green and about half the length of the inner.—There are color forms. Var. *Nelsoni*, Baker (*L. Nelsoni*, Hort.), has bright yellow fls. with all segms. tinged faintly green.

2. *L. pendula*, Ait. More robust: lvs. often 2 in. broad: fls. drooping or cernuous, to  $1\frac{1}{2}$  in. long; outer segms. nearly as long as inner, narrow, yellow with red above; inner segms. bright red-purple at top.

13. **MUSCARI**, Mill. Forty to 50 small bulbous scapose plants of the Medit. region and S. W. Asia, several of which are planted, one commonly.—Lvs. few, from a tunicate bulb, narrow, more or less fleshy: fls. small, racemose or spicate at top of scape, nodding or pendulous, mostly blue, the bracts of the short pedicels small and scarious; perianth gamophyllous, mostly urn-shaped, sometimes globose or oblong, the 6 segms. or teeth recurved or reflexed; stamens 6, attached on the perianth in 2 rows, anthers versatile; pistil 1, with sessile ovary and short 3-lobed style: caps. 3-angled, loculicidal. (*Musca-ri*: Latin, alluding to musky odor of some species.)

**M. botryoides**, Mill. GRAPE-HYACINTH. Bulb ovoid or oblong: scape 4–12 in. high, slender: lvs. linear, about equaling the scape, blunt or short-acute: fls. more or less than a dozen, aggregated at top of scape or sometimes open-racemed, blue (but running to white vars.), about  $\frac{1}{2}$  in. long, somewhat restricted at apex, uppermost fls. sterile; segms. very short, recurved: spring. S. Eu.; common in yards and also naturalized.

14. **HYACINTHUS**, L. HYACINTH. Species probably exceeding 30, Medit. region, trop. and S. Afr., bulbous scapose plants, of which one is everywhere cult.—Bulb tunicate, often large: lvs. radical, narrow: fls. in terminal raceme,

erect or pendulous, red, blue, white, yellowish, the pedicels subtended by narrow scariosse bracts; perianth funnellform to bell-shaped, gamophyllous, the 6 segms. spreading or reflexed, tube sometimes gibbous at or near the base; stamens 6, short, attached on tube or throat of perianth, anthers attached by the back; pistil 1, with sessile 3-celled ovary and usually simple stigma: caps. usually 3-angled or -lobed, loculicidal. (Hyacinthus: an early Greek name.)

**H. orientalis**, L. COMMON HYACINTH. Bulb large, nearly globular: scape 6-18 in. tall, hollow: lvs. several, thick, strap-shaped, obtuse, many-nerved, 1 in. and more wide, at length equaling or exceeding the scape: fls. in many colors and sometimes double, in a terminal raceme, declined or drooping, tube swollen at base, the long lobes wide-spreading or reflexed; pedicel shorter than fl., with very small bract: early spring. Greece to Syria and Asia Minor.—Var. **albulus**, Baker. ROMAN HYACINTH of florists. Smaller, very early: fls. fewer in more open raceme, white to light blue, the tube slender and little swollen at base. S. France.

15. **GALTONIA**, Decne. Three stout bulbous scapose plants from S. Afr., one in common cult.—Bulb tunicated: lvs. few or several, large, somewhat fleshy: fls. in a long open raceme, white or tinged green, on large-bracted pedicels; perianth gamophyllous, the tube relatively short, segms. oblong and prominent; stamens 6, attached below the throat, filaments slender, anthers versatile; pistil 1, with sessile many-ovuled ovary, cylindrical style and capitate stigma: caps. more or less 3-sided, loculicidal. (Galtonia: Sir Francis Galton, 1822-1911, anthropologist.)

**G. candicans**, Decne. (*Hyacinthus candicans*, Baker). SUMMER-HYACINTH. Showy summer- and autumn-blooming plant: bulb large, globose: scape 2-4 ft., strict and stout: lvs. 2-3 ft. long, strap-like, 1-2 in. broad: fls. 20-30, white, fragrant, cernuous at least toward top, 1-1½ in. long, narrow-campanulate; segms. exceeding the tube; pedicels becoming 1-2½ in. long, equaling or exceeding the great bract: pod erect or ascending, 1-1½ in. long.

16. **CHIONODOXA**, Boiss. Five or 6 little bulbous scapose very early-blooming alpine and subalpine plants from Crete and Asia Minor, one commonly cult.—Bulb tunicate: scape short, rising little above the ground: lvs. 2 or 3 to each scape and at length equaling or exceeding it: fls. blue (red and white color-forms), few, in a short open raceme with prominent pedicels, ascending, horizontal or cernuous; perianth gamophyllous, open-campanulate or rotate, the tube very short; stamens 6, attached on throat, filaments expanded, anthers versatile; pistil 1, with 3-celled many-ovuled ovary, short or wanting style and capitate stigma: caps. 3-angled or -winged, loculicidal. (Chionodoxa: Greek *glory of the snow*.)

**C. Luciliæ**, Boiss. Variable in cult., blooming in earliest spring: scape 3-6 in., usually lengthening in fr.: lvs. from linear and grass-like to oblanceolate, at first shorter than infl.: fls. less than a dozen, usually 4-6, lower ones cernuous on slender pedicels, bright blue with white center, 1 in. or less across: fr. broad as long, strongly 3-sided, freely produced. Asia Minor.—Cult. forms are known as *C. gigantea*, *C. grandiflora*, and others, some of them with lilac-red and shaded white fls.; *C. Tmolusii* is a later-blooming form. **C. sardensis**, Drude, perhaps a distinct species, is few-fl. and smaller, fls. dark blue without eye.

17. **ALOE**, L. **ALOE**. Species about 100 in the Old World, largely in trop. and S. Afr., plants often with stiff basal rosettes of succulent lvs. from which arise the flowering sts. or scapes, but sometimes with elongated leafy sts.—Perennial: caudex (when present) simple or branched: lvs. mostly sharp-pointed and hard-toothed or spiny on the edges: fls. in racemes or umbels, often much elevated above the lvs. and showy, mostly bright red and yellow, on solitary pedicels with scariosse bracts; perianth tubular and straight or curved, cylindrical or nearly so, the segms. distinct or connate at base and the tips more or less spreading; stamens 6, hypogynous, sometimes exserted, filaments

slender, anthers versatile; pistil 1, with sessile many-ovuled ovary and capitate stigma: caps. 3-angled, loculicidal. (Alo-e: from old Arabic name.)—Many aloes are to be expected in choice collections of succulents, and several species are planted out from greenhouses. There is one wide-spread species (No. 1) although little seen outside the tropics; and another is sometimes grown in window-gardens. The so-called American aloe is Agave.

Fls. on bracted scapes: lvs. radical, very fleshy.....1. *A. vera*  
Fls. racemose from long leafy sts., the lvs. thin.....2. *A. ciliaris*

1. *A. vera*, L. TRUE ALOE. BARBADOS ALOE. Nearly or quite acaulescent, the rosette arising from the ground, propagating by stolons: lvs. 1–2 ft. long, erect, thick and full of juice, glaucous-green, narrow-lanceolate and long-acuminate, with spiny teeth on margins: fls. yellow, about 1 in. long, cernuous in a dense raceme, the scape equaling or exceeding the lvs.; stamens equaling perianth, style usually exserted. Medit. region; runs into several forms.

2. *A. ciliaris*, Haw. Sts. 18 in. and more long, weak and decumbent, glabrous: lvs. thin and wavy, linear-lanceolate, tapering from the base, 5–6 in. long and about  $\frac{3}{4}$  in. broad at base, long-pointed, white-toothed on the margins, with a clasping sheath: fls. bright red with greenish tip, 1 in. or somewhat more long, racemose on long peduncles; stamens little if any exserted. S. Afr.

18. ASPARAGUS, L. About 150 species, from Siberia to S. Afr., one everywhere grown for food and a few others common as ornamental plants.—Erect or climbing, branching, sometimes more or less woody, the roots cord-like, rhizomatous or tuberous: lvs. reduced to mere dry scales, the foliage represented by green lf.-like branchlets or cladodes which are sometimes needle-like and sometimes expanded: fls. small, usually greenish, few or many, in racemes or umbels, or sometimes 1 and axillary, pedicels jointed; perianth bell-shaped, of 6 separate more or less connivent segms.; stamens 6, attached on base of perianth, anthers versatile; pistil 1, with sessile 3-celled 2- or few-seeded ovary and mostly 3-lobed stigma: fr. a berry. (Aspar-agus: the ancient Greek name.)

Plant erect, grown for food: fls. dioecious.....1. *A. officinalis*

Plant climbing or drooping, grown for ornament: fls. bisexual, or not dioecious.

Cladodes ("lvs.") expanded, ovate.....2. *A. asparagoides*

Cladodes flat, linear-falcate in a compound or branched cladophyll or frond.....3. *A. drepanophyllus*

Cladodes flat, linear, straight, 1 in. long.....4. *A. Sprengeri*

Cladodes flat, linear-falcate,  $\frac{1}{2}$  in. or less long.....5. *A. scandens*

Cladodes needle-like, small and short.

Root tuberous: cladodes in 3's.....6. *A. crispus*

Root not tuberous: cladodes several to many in little fascicles...7. *A. plumosus*

1. *A. officinalis*, L., var. *altilis*, L. COMMON OR GARDEN ASPARAGUS. Abundantly grown for the edible spring shoots, and also more or less run wild. Root of many cord-like fleshy parts: st. 3–10 ft., erect and much branched, glabrous and slightly glaucous, the strong spring shoots bearing prominent appressed scale-like lvs.: cladodes ("lvs.") thread-like,  $\frac{1}{2}$  in. or less long, 1 to several in the axil: dioecious: fls. 1–4 in axils of cladodes, bell-shaped, the sterile yellowish-green and nearly  $\frac{1}{4}$  in. long and with undeveloped pistil, the fertile smaller and less conspicuous with  $\frac{3}{4}$  protruding stigmas: fr. a hanging red berry  $\frac{3}{8}$  in. or less diam.; seeds several,  $\frac{1}{8}$  in. or less diam., rounded on back, black. Coasts and sandy areas, Great Britain to Cent. Asia, the native form with prostrate base and short branches.

2. *A. asparagoides*, Wight (*A. medeoloides*, Thunb. *Myrsiphyllum asparagoides*, Willd.). SMILAX of florists. Tall much-branched glabrous vine with a cluster of tuberous roots: cladodes ("lvs.") ovate, sharp-pointed, about 1 in. long, stiffish, shining, strongly many-veined: fls. 1 or 2 to a scale or true lf., greenish-white, about  $\frac{3}{8}$  in. long, on very slender pedicels of nearly or quite equal length: berry dark purple, about  $\frac{1}{2}$  in. diam., with 1–3 seeds; seeds globular, black. S. Afr.—Var. *myrtifolius*, Hort., BABY SMILAX, is a lighter and more graceful form with smaller lvs. Smilax of botanists is a very different plant, represented in the wild by the greenbriers (see page 152).

3. *A. drepanophyllus*, Welw. (*A. Duchesnei*, Lind.). Roots tuberous, very long: sts. very tall (20–30 ft.), woody, climbing, without main branches: cladodes in



fascicles of 2-5 (sometimes single), the central one 1-3 in. long and others shorter, flat, linear-falcate, arranged in one plane on shoots 1 in. to 2 ft. long making a fern-like frond or cladophyll, the scales spiniferous: fls. greenish, in close erect racemes, pedicels deflexed: berry 3-lobed, scarlet,  $\frac{1}{2}$  in. diam., usually 1-seeded. Cent Afr.

4. *A. Sprengeri*, Regel. Commonly cult.: root with white short tubers: sts. drooping or scrambling, 3-6 ft. long, glabrous, much branched: cladodes about 1 in. long (more or less), flat, linear, straight or only slightly curved, 3-8 together, scales on main sts. spiniferous: fls. pinkish, fragrant, in loose racemes 1-3 in. long: berry somewhat 3-lobed, bright red,  $\frac{1}{2}$  in. or less diam., 1-3-seeded. (Bears name of Carl Sprenger, nurseryman, Naples, Italy.) S. Afr.—Variable; there is a compact (dwarf) and a variegated form.

5. *A. scandens*, Thunb. Slender, climbing, branching: cladodes flat, in 3's,  $\frac{1}{2}$  in. or less long, linear and curved, prominently costate: fls. greenish-white, solitary or in 2's, about  $\frac{1}{8}$  in. long, pendulous on a slender pedicel  $\frac{1}{4}$ - $\frac{1}{2}$  in. long: berry scarlet, 1-seeded, globose,  $\frac{1}{2}$  in. diam. S. Afr.—Var. *deflexus*, Baker, is smaller with deflexed and zigzag branches, cladodes  $\frac{1}{4}$  in. or less long and firmer in texture, fls. smaller.

6. *A. crispus*, Lam. (*A. decumbens*, Jacq.). Root with clustered short tubers: st. very slender and weak, not woody, climbing or drooping, branched, 3-6 ft.: cladodes 2 or 3, reflexed and 3-angled, or somewhat flattened,  $\frac{3}{8}$  in. or less long: fls. axillary, solitary or in 2's, white and fragrant, on pedicels about  $\frac{1}{4}$  in. long: berry white or pink,  $\frac{1}{2}$ - $\frac{1}{2}$  in. diam., with several small black seeds. S. Afr.

7. *A. plumosus*, Baker. ASPARAGUS-FERN. Commonly cult. by florists to be cut in strands for decoration: root with long slightly fleshy not tuberous parts: st. tall climbing, woody, glabrous; branches and cladodes very many, close together, in flat horizontal frond-like decorative sprays that are more or less triangular in outline: cladodes many in a fascicle, filiform and bright green, mostly  $\frac{1}{4}$  in. or less long; main lf.-scales spiniferous: fls. whitish, 1-3 or 4 on short pedicels, about  $\frac{1}{8}$  in. long: berry purple-black, globose,  $\frac{1}{4}$  in. diam., 1-3-seeded. S. Afr.—Runs into several forms. Var. *nanus*, Nichols. DWARF ASPARAGUS-FERN. Common in cult.: plant not making tall vine: cladodes very many and short. Var. *compactus*, Hort., dwarf. Var. *robustus*, Hort., is a strong grower, cladodes shorter than in *A. plumosus* and the fronds longer and more irregular. Var. *comorensis*, Hort., is a very robust form with very regular broad-triangular delicate fronds.

19. *RUSCUS*, L. Three, 4 or 5 species of erect low shrubs, from the Madeira Isls. to the Caucasus, one species frequently planted in warmer parts of the U. S.—Lvs. represented by minute scales subtending expanded flat stiff strongly nerved persistent lf.-like cladodes: fls. dioecious, solitary or fascicled, small, greenish, attached on the midrib on the upper or lower surface of the cladodes; perianth of 6 distinct segms.; stamens 3, filaments connate; pistil 1, with sessile 1-celled ovary, stigma capitate: fr. a globose pulpy 1-seeded berry. (Rus-cus: old Latin name.)

*R. aculeatus*, L. BUTCHERS BROOM. Evergreen, 2-3 ft., stiff, with crowded lf.-like ovate spine-pointed cladodes  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, in shape much like those of florist's smilax: berry red or yellow,  $\frac{1}{2}$  in. or less diam. Great Britain and continent. —Dried sprays are often dyed for use in decoration.

20. *GLORIOSA*, L. CLIMBING-LILY. Six or more tuberous-rooted species in trop. Afr. and Asia, most of them climbing by tendril-like prolongations of the lvs.; fls. showy; grown in greenhouses N.—Sts. long and weak: lvs. opposite, verticillate or alternate: fls. solitary in upper axils, lily-like, red or yellow; segms. narrow and separate, often crisped, erect, wide-spreading or reflexed; stamens 6, hypogynous or on the very base of perianth, the filaments long and slender, anthers versatile; pistil 1, with sessile 3-celled ovary and filiform 3-parted style: caps. loculicidal. (Glorio-sa: Latin *gloriosus*, full of glory.)

Perianth-segms. very narrow and much crisped. .... 1. *G. superba*  
Perianth-segms. broad, little if at all crisped but perhaps undulate ... 2. *G. Rothschildiana*

1. *G. superba*, L. Climbing 5 ft. or more: lvs. long-lanceolate to narrowly ovate-lanceolate: segms. linear to narrow-lanceolate, 2-3 in. long, much crisped as if twisted, yellow changing to red (a yellow-fl. form in cult.), horizontal to reflexed. Trop. Afr. and Asia.

2. *G. Rothschildiana*, O'Brien. Tall climbing: lvs. broad-lanceolate to broadly ovate-lanceolate: fls. deflexed by crook in the slender pedicel; segms. oblong-lanceolate to ovate-lanceolate, 2-3 in. and more long, plane or undulate on the margins, whitish and yellow at the base, crimson and more or less margined above, (citron-yellow form in cult.), strongly reflexed. (Walter Rothschild, who cultivated it in England from tubers received from Uganda.) Trop. Afr.

21. *TRICYRTIS*, Wall. About 9 species of erect herbs with short or obsolete rhizomes, of E. Asia, one of which is frequently planted in the open for its spotted axillary fls.—Sts. leafy, mostly simple: lvs. alternate, broad, nearly sessile or clasping: fls. terminal or axillary, rather large but not lily-like, spotted inside; perianth bell-shaped, of 6 distinct segms. of which the 3 outer are saccate at base; stamens 6, hypogynous, the flattened filaments connate; pistil 1, ovary 3-celled, styles 3 and each 2-parted: caps. septicidal, many-seeded. (Tricyrtis: Latin *three convexities*, referring to nectar-sacs on outer segms.)

*T. hirta*, Hook. (*Compsoa hirta*, Kuntze). TOAD-LILY. Strict, 1-3 ft., soft-hairy all over: lvs. ovate, clasping, strongly several-nerved: fls. few to several in axils of lvs. and bracts, erect, pedicelled, trumpet-shaped, about 1 in. long, whitish with many purple or blackish spots inside. Japan.

22. *AGAPANTHUS*, L'Her. (*Abumon*, Adans.). One variable species, or several segregates, in S. Afr., common as a pot-plant.—Scapose: lvs. many, long and narrow, radical: fls. many in terminal umbel, the cluster issuing from a 2-bracted caducous spathe; perianth gamophyllous, funnel-shaped, the segms. oblong and about the length of the tube or exceeding it; stamens 6, inserted on throat, filaments filiform; ovary 3-celled, sessile: caps. loculicidal. (Agapanthus: Greek *love flower*.)

*A. africanus*, Hoffmg. (*A. umbellatus*, L'Her. *Tulbaghia africana*, Kuntze). AFRICAN-LILY. Root of many strong cord-like parts: scape strong, erect, 2-3 ft.: lvs. linear-lanceolate to lorate, basal: fls. 10-50 or more in a strongly rayed umbel, bright blue, 1-2 in. long, the narrow segms. prominent and spreading: summer.—Runs into many forms, varying in stature, in number and size of fls., in size and breadth of lvs., in season of bloom. There are white-fl'd. and striped-leaved vars.

23. *SANSEVIERIA*, Thunb. BOWSTRING-HEMP. Stiff-leaved plants used for pot and porch decoration, the lvs. being barred, striped or variegated (in cult. forms); species more than 50, in Afr. and Asia.—Rhizome prominent, horizontal, bearing the erect mostly rigid flat or concave or terete lvs. with large bracts at their bases: scape about as long as lvs., slender, bracted: fls. racemose or spicate or fascicled, whitish or yellowish, on jointed pedicels; perianth tubular, with 6 narrow spreading somewhat unequal lobes, tube usually swollen at the base; stamens 6, attached on the throat, usually curved and exserted, anthers versatile; ovary free, 3-celled, with solitary ovules, stigma capitate and usually exserted: fr. a 1-3-seeded berry. (Sansevieria: Raimond de Sangro, Prince of Sansevierio, born at Naples, Italy, 1710.)—What species of *Sansevieria* may be in cult. in N. Amer. is difficult to say; they have not been carefully collected. The lvs. yield strong fiber.

Lvs. nearly or quite flat at middle.....1. *S. thyrsiflora*  
Lvs. concave at middle, narrow.....2. *S. zeylanica*  
Lvs. cylindrical.....3. *S. cylindrica*

1. *S. thyrsiflora*, Thunb. (*S. guineensis*, Willd. *Cordylina guineensis*, Britt.). Lvs. few (2-4) in a cluster, 1-1½ ft. long, to 3½ in. broad, lanceolate, acute or obtuse, flat or nearly so, but tapering into a channelled petiole, with close pale green transverse bands on both surfaces but which become faint with age: fls. 2-6 together in a spike-like raceme, greenish-white, fragrant, the tube about ¾ in. long, the linear revolute segms. of similar length. S. Afr.—Several species are known in literature and cult. as *S. guineensis*.

2. *S. zeylanica*, Willd. Lvs. 5-11 in a cluster, 1½-2½ ft. long, ¾ in. or less broad, linear-semiterete, channelled down the face and very rounded on the back,

dark green and transversely banded with somewhat lighter green and with darker green longitudinal lines on back. Ceylon; the plants grown under this name probably do not belong to this species.—That known as *S. zeylanica* var. *Laurentii* is probably *S. trifasciata*, Prain, var. *Laurentii*, N. E. Br., having linear-lanceolate or narrow long-lanceolate lvs. longitudinally striped golden-yellow, channelled at least below. Belgian Congo, introduced by Emile Laurent.

3. *S. cylindrica*, Bojer. Lvs. 3-4 in a cluster, large, terete or slightly compressed, 2½-5 ft. long, 1¼ in. or less thick at broadest place, sometimes with very shallow groove on inner face, with transverse bands of darker green and with many dark green longitudinal lines: fls. 5 or 6 in a cluster in a long raceme, white or tinted, tube 1 in. or less long, the long linear revolute lobes usually somewhat shorter. Angola, trop. Afr.

24. **ROHDEA**, Roth. One species in China and Japan, with the look of an aroid, grown for the decorative foliage, particularly by Chinese and Japanese.—Rhizome short and thick: scape much shorter than foliage: lvs. many, radical, erect, lorate, veiny: fls. packed in a thick short spike or head terminating the scape; perianth globose-campanulate, with 6 short segms.; stamens 6, anthers sessile; stigma peltate, nearly or quite sessile on a 3-celled ovary: fr. an indehiscent red-fleshed large berry, usually 1-seeded. (Rohd-ea: Dr. Rohde, physician and botanist of Bremen.)

*R. japonica*, Roth. Lvs. flat or somewhat conduplicate, 2-3 in. broad, 1-2 ft. long, coriaceous, narrowed at base into petiole-like part.—The Omoto or Mannensei of the Japanese, and national fl. of the Manchus. There are very many fancier's vars., with variegated and striped lvs. of different sizes, and plants of different stature. Sometimes cult. in Calif. and elsewhere.

25. **CONVALLARIA**, L. LILY-OF-THE-VALLEY. Low scapose plant, everywhere prized for its fragrant dainty fls. in spring; it is native Eu. to E. Asia, also in mts. Va. to S. C., and naturalized more or less in other parts of U. S., although the Japanese and E. American plants have been described as distinct, the plant is generally regarded as a single wide-spread species.—Rootstocks (pips) more or less erect from long horizontal deep slender branches: lvs. 2, which with the single scape arise from basal scarious sheaths: fls. few to many, drooping in a second small-bracted raceme; perianth teacup-shaped, gamophyllous, with 6 short recurved lobes; stamens 6, attached on base of perianth, shorter than the straight style; ovary sessile, 3-celled: fr. a globular few-seeded red berry. (*Convallaria*: Latin *Lilium convallium*, "lily of the valley.")

*C. majalis*, L. Lvs. oblong-oval, one above the other: fls. white, ¾ in. across or larger in cult. races, the raceme usually about equaling the lvs.

26. **ASPIDISTRA**, Ker. Half dozen or less species of acaulescent plants with strong radical foliage, from Himalayas, China, Japan, one of which is commonly grown as a pot and window-garden subject.—Rhizome strong: fls. borne singly at surface of ground beneath the foliage and therefore not often observed, dull brown or brown-purple to greenish, subtended by scarious bracts; perianth bell-shaped, the tube short, the segms. usually spreading; stamens 8, attached at middle of tube, anthers dorsifixed; ovary sessile and free, 4-celled, stigma expanded and peltate: fr. an indehiscent 1-seeded berry. (*Aspidistra*: Greek *small round shield*, describing the stigma.)

*A. elatior*, Blume (*A. lurida*, Hort., not Ker). Lvs. many from matted tough rootstocks, evergreen, stiff, 1-2½ ft. high, petioled, the blade strongly veined, 3-4 in. broad, wide-oblong-elliptic: fls. about 1 in. across, purple-brown, in spring. China.—Sometimes called "cast-iron plant" from ability to withstand hard usage.

27. **HOSTA**, Tratt. (*Funkia*, Spreng.). PLANTAIN-LILY. Tufted plants with broad several-ribbed radical lvs. and scapes of white or blue ascending horizontal or drooping fls., commonly planted both for the ornamental

clumps of foliage and the bloom; species about 10 in China and Japan.—Root-part of many strong cord-like members: scapes simple, sometimes with lf.-like bracts below the infl., longer or shorter than the lvs: fls. with a tube, often very long, which is much expanded at the throat, the lobes 6 and nearly erect or spreading; stamens 6, hypogynous or attached to the tube, curved, mostly equaling the perianth or somewhat exserted; ovary sessile, 3-celled, style filiform, stigma small usually protruding: caps. elongated, loculicidal. (Host-a: commemorates N. T. Host, Austrian botanist and physician, died 1834.)

Fls. white, ascending, 4 in. or more long; stamens adnate to tube. . . . . 1. *H. plantaginea*  
Fls. lilac or blue (rarely white vars.), declined on drooping, 3 in. or less long; stamens free.

Lvs. persistently glaucous, prominently cordate.  
Scape overtopped or equaled by lvs. . . . . 2. *H. Sieboldiana*

Scape prominently exceeding lvs. . . . . 3. *H. Fortunei*

Lvs. not prominently glaucous, usually not cordate.

Tube of perianth abruptly expanding into bell-shaped part of fl.

which is usually deep or purple-blue. . . . . 4. *H. cærulea*

Tube gradually widening, making a funnel-shaped fl. which is pale lilac or lavender or almost white.

Lf.-blades ovate, nerves 6 or more each side of midrib. . . . . 5. *H. undulata*

Lf.-blades narrower, nerves 5 or less. . . . . 6. *H. japonica*

1. *H. plantaginea*, Aschers. (*Funkia subcordata*, Spreng. *Niobe plantaginea*, Nash). LARGE WHITE PLANTAIN-LILY. Strong plant blooming in late summer and autumn: scapes  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft., overtopping the foliage, often with a green lf.-like bract toward the top; lvs. not glaucous, large, long-petioled; blade ovate to cordate-ovate, 6–10 in. long, 4–6 in. broad, with many strong side ribs: fls. white, fragrant, ascending, pedicelled often from 2 scarious bracts (1 bract very large and smaller one inside); perianth 4–5 in. long, the segms. much shorter than the long slender tube: caps. narrow, 2–3 in. long, sharp-pointed. Japan and China.

2. *H. Sieboldiana*, Engler (*Funkia Sieboldiana*, Hook. *Niobe Sieboldiana*, Nash). Strong clumps of heavy very glaucous foliage that overtops the scapes and therefore usually hides the fls., blooming in late spring and early summer: scape without bracts or lvs. below infl., lower bracts of raceme  $1\frac{1}{2}$ –3 in. long: lvs. large, the blade cordate-ovate, 10–15 in. long and 6–10 in. wide, short-pointed, petiole equaling or exceeding the blades, nerves about 12 either side of midrib: fls. many, faint lilac, most of them pendulous (except at top), pedicelled from single scarious bracts; perianth  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. long, tube very slender at base but expanded upward, segms. about  $\frac{3}{4}$  in. long: caps. narrow, declined,  $1\frac{1}{2}$  in. long, not prominently pointed. (For P. F. von Siebold, page 87.) Japan.

3. *H. Fortunei*, Bailey (*Funkia Fortunei*, Baker. *Niobe Fortunei*, Nash). Season of No. 2, but less massive and the raceme much surpassing the foliage: scape without several bracts or lvs. below the infl.; lower bracts of raceme about 1 in. long: lvs. smaller, the blades 4–5 in. long and  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. broad, cordate-ovate, pale green and glaucous, the petiole  $3\frac{1}{2}$  in. or less long and shorter than the blade, the nerves 10–12 on either side the midrib: fls. about  $1\frac{1}{2}$  in. long, pale purple or nearly white, gradually widening from base, segms. about half length of tube. (For Robt. Fortune, page 447.) Japan.

4. *H. cærulea*, Tratt. (*Funkia ovata*, Spreng. *F. cærulea*, Sweet. *Niobe cærulea*, Nash). Commonly planted, blooming in summer: scape overpassing the clump of foliage,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft., usually leafy-bracted below the infl., lower bracts in raceme 1 in. or less long: lvs. broadly ovate, sometimes subcordate at base but usually abruptly narrowed to winged petiole that equals or exceeds blade, the latter 4–9 in. long and 3–5 in. broad, margin often wavy, nerves 6–9 on either side: fls.  $1\frac{1}{2}$ –2 in. long, usually deep blue but sometimes pale, tube less than half length of perianth and suddenly widened into bell-shaped part: caps.  $1\frac{1}{2}$  in. long. Japan, China, Siberia.

5. *H. undulata*, Bailey (*H. lancifolia* var. *undulata*, Bailey. *Funkia undulata*, Otto & Dietr. *Niobe undulata*, Nash). Late spring, usually following Nos. 2 and 3: scape very tall, often 3 ft. and more, usually bearing prominent small long-petioled lvs., much surpassing the foliage: lvs. many, with margined petioles usually longer than blades, the latter 6–8 in. long and 5 in. or less broad, broadly ovate, abruptly narrowed to petiole, nerves 6–10 either side midrib, margins undulate: fls. many, about 2 in. long, pale lavender, gradually widening and funnelform, segms. half length of tube. Japan.—A var. has lvs. banded longitudinally white.



6. *H. japonica*, Voss (*H. lancifolia*, Tratt. *Funkia lancifolia*, Spreng. *Niobe japonica*, Nash). Summer: scape  $1\frac{1}{2}$ -2 ft., bearing a few small lvs. surpassing the foliage: lvs. many, petioles much exceeding blade, the latter lanceolate to ovate-lanceolate, tapering both ways and sharp-pointed, 4-6 in. long and  $1\frac{1}{2}$ -2 in. broad, with 3-5 nerves either side midrib: fls.  $1\frac{1}{2}$ -2 in. long, lilac or pale lavender, gradually widening, tube less than half length of perianth. Japan.—There is a var. with striped lvs. Var. *tardiflora*, Bailey (*Niobe japonica* var. *tardiflora*, Nash), blooms in autumn.

28. **HEMEROCALLIS**, L. DAY-LILY. A half-dozen species, Cent. Eu. to China and Japan, much prized in open planting for the large lily-like yellow, orange, and reddish fls.—Root of many strong fleshy and tuberous parts: scapes tall, usually much exceeding the many radical or basal narrow keeled lvs., branching above so that the infl. is sometimes semi-paniculate: perianth funnellform to bell-shaped with tube widely expanding upward and wide-flaring border, segms. often recurved; stamens 6, inserted in the throat, filaments slender, anthers more or less versatile; ovary oblong, sessile or nearly so, 3-celled, style long and slender, stigma small: caps. (when produced) loculicidal, with rather few seeds. (Hemerocal-lis: Greek *beautiful for a day*, the fls. short-lived.)

Fls. clear yellow, fragrant.

Inner segms. with membranaceous margins, the veins more or less joined.

Lvs.  $\frac{1}{4}$  in. or less wide.....1. *H. minor*

Lvs.  $\frac{1}{2}$  in. or more wide.

Width of inner segms.  $\frac{1}{2}$  in. or less.....2. *H. Dumortieri*

Width of inner segms.  $\frac{3}{4}$  in. or more.....3. *H. Middendorffii*

Inner segms. not membranaceous on margins and veins not running together.

Blooming in spring (as May-June).....4. *H. flava*

Blooming in summer (as June-July).....5. *H. Thunbergii*

Fls. orange to orange-red.

Blossoms fragrant; segms. nearly erect.....6. *H. aurantiaca*

Blossoms inodorous; segms. wide-spreading.....7. *H. fulva*

1. *H. minor*, Mill. Narrow-leaved species: lvs. 12-20 in. long,  $\frac{1}{4}$  in. or less wide, usually lower than the scape: fls. 3-6, yellow, fragrant, 4 in. or less long, the cylindrical tube  $\frac{1}{2}$ -1 in. long, pedicels short or long (to 2 in.), with small lanceolate bracts; outer segms. less than  $\frac{1}{2}$  in. broad, inner broader with membranaceous margins and veins running together. E. Siberia to Japan.

2. *H. Dumortieri*, Morr. Lvs. 12-18 in. long,  $\frac{3}{4}$  in. or less broad, equaling or exceeding scape: fls. 2-3, yellow, fragrant,  $2\frac{1}{2}$  in. or less long, the tube very short ( $\frac{1}{4}$  in. or less), pedicels  $\frac{1}{4}$ - $\frac{1}{2}$  in. long with broad lanceolate bracts of equal length; outer segms. less than  $\frac{1}{2}$  in. broad, inner ones  $\frac{1}{2}$  in. broad and membranaceous margins and veins running together. (Named probably in honor of B. C. Dumortier, 19th century Belgian botanist.) Siberia, Japan.

3. *H. Middendorffii*, Tratt. Lvs. 12-18 in. long,  $\frac{3}{4}$ -1 in. broad, not equaling the scape: fls. 2-4 yellow, fragrant, 3-4 in. long, cylindrical tube  $\frac{1}{2}$  in. long, pedicels very short with large deltoid bracts 1 in. long; outer segms.  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, the inner ones mostly broader and obtuse with membranaceous margins and veins running together. (Name commemorates Dr. A. Th. v. Middendorff, Russian botanist.) E. Siberia.

4. *H. flava*, L. COMMON YELLOW DAY-LILY. Early-flowering, in middle and late spring: lvs. 1-2 ft. long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, not equaling scape: fls. 5-9, yellow, fragrant, 3-4 in. long, cylindrical tube  $\frac{1}{2}$ -1 in. and more long; pedicels 1-2 in. long with small lanceolate bracts; segms. about  $\frac{3}{4}$  in. or less broad, veins not anastomosing or running together. E. Siberia to Japan.

5. *H. Thunbergii*, Baker. Late-blooming, in summer: lvs. to 2 ft., equaling scape, linear: fls. 8-10, lemon-yellow, about 3 in. long, the cylindrical tube nearly 1 in. long; upper part of scape thickened and flattened. (Bears the name of Karl Peter Thunberg, page 699.) Japan.

6. *H. aurantiaca*, Baker. Lvs. 6-8 to a scape and as long, 2-3 ft., 1 in. or more broad, sharply keeled: fls. 6-8, bright orange, fragrant, 3-4 in. long, cylindrical tube about  $\frac{3}{4}$  in. long, outer segms. oblong-lanceolate and 1 in. broad, the inner narrow, fl. not opening widely as in other species. Japan.

7. **H. fulva**, L. COMMON ORANGE DAY-LILY. Summer-blooming; common in yards and also run wild: lvs. 2 ft. or more long, and 1 in. broad more or less, not equaling the scape: fls. 6-10 or 12, orange-red or fulvous-red, not fragrant, 3-5 in. long, slender tube 1 in. or less long, pedicels short with small lanceolate bracts; outer segms.  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, inner ones 1 in. broad with somewhat undulate margin and veins much run together. France to Japan, probably early introduced into Eu.—There are several forms of it cult. Var. **Kwanso**, Regel, has double fls. of longer duration.

29. **YUCCA**, L. About 30 bayonet-leaved showy-fl'd. species, of the tablelands of Mex. and northward, also somewhat in W. Indies and E. U. S.; all are striking plants, but few are commonly planted.—Stemless or rising to stature of small trees: lvs. stiff and long-pointed, often toothed or fibrillose on margins, mostly in rosettes at surface of ground or ends of trunk or branches: fls. cup-shaped or saucer-shaped, usually of waxy texture, white, cream, or violet, opening and fragrant at night, commonly hanging, borne mostly in erect panicles that usually overtop the lvs.; segms. 6, distinct or connate at base; stamens 6, hypogynous; ovary sessile, 3-celled, style thick and 3-lobed at top: fr. a caps. or somewhat fleshy. (Yuc-ca: modification of an aboriginal name, applied to another plant.)

Lvs. not rough-edged, with prominent long filaments or threads along edge: nearly or quite acaulescent: fr. dry.....1. *Y. filamentosa*

Lvs. not rough-edged, without filaments or with very few when old: with trunk: fr. dry.....2. *Y. gloriosa*

Lvs. sharply rough-edged: with trunk: fr. fleshy.....3. *Y. aloifolia*

1. **Y. filamentosa**, L. ADAMS NEEDLE. Native from S. C. south, but hardy north and the common yucca in gardens: acaulescent or nearly so: scape stout and strict, bracteate, 3-12 ft. high, bearing a long panicle with spreading or ascending branches: lvs. many, in a radical or basal rosette, 1 in. broad and 1-2½ ft. long, sharp-pointed, with long curly threads on the edges: fls. many, hanging, nearly white, the segms. 1-2 in. long: caps. 1½-2 in. long, with rounded angles. Summer.

2. **Y. gloriosa**, L. SPANISH DAGGER. Native along coast S. C. to Fla., and planted S.: trunk short or rising to 6 or 8 ft.: lvs. 2-2½ ft. long, 2 in. broad, often with a few threads when old and a few deciduous teeth when young, tip short, stiff and red: fls. many, hanging, greenish-white to reddish, 3-4 in. across at full anthesis: caps. 6-ridged, not dehiscent.—There are forms with striped lvs., and smaller stature. Summer and autumn.

3. **Y. aloifolia**, L. SPANISH BAYONET. Native N. C. south and along the Gulf to La.; also W. Indies and Mex., probably naturalized; common in gardens and division lines in warm temp. regions: trunk 2-3 ft. and the plant often much taller and sometimes 25 ft., simple or branched, the main trunk often inclining: lvs. 1½-2½ ft. long, to 2½ in. wide, stiff and bayonet-like, very sharp-pointed: fls. many, hanging, white often purple-tipped, 3-4 in. across at full anthesis: fr. fleshy, black-purple, 3-4 in. long. Summer.—There are forms with striped and colored lvs.

30. **PHORMIUM**, Forst. Two species of New Zeal. and Norfolk Isls., one of which is grown in warm temp. regions as a striking lawn plant, for its many long lvs. (which produce a strong fiber).—Rhizome fleshy, short and branched: lvs. many, radical, long-sword-shaped, equitant, very tough: scape tall, usually exceeding the foliage, bearing the bloom on alternate bracted branches: fls. dull red or yellow, 1-2 in. long, on jointed pedicels; perianth tubular and curved, the 6 segms. connate at base, 3 inner ones longer; stamens 6, inserted at base of segms., exserted; ovary sessile, 3-celled, style declinate, stigma capitate: fr. a loculicidal caps. (Phor-mium: Greek *basket*, alluding to the uses of the fiber.)

**P. tenax**, Forst. NEW ZEALAND FLAX. Lvs. 3-9 ft. long in its native country and 2-5 in. broad, slit at apex when mature, keeled, very tough, margins and midrib bordered with red or orange line: scape to 15 ft., with numerous fls.: caps. 2-4 in. long.—There are various striped- and colored-leaved forms in cult.

31. **LIRIOPE**, Lour. Small grass-leaved tufted or matted plants used mostly for edgings in warmer parts of the country and in greenhouses; 2 or 3

species in E. Asia.—Rhizome short and thick, plant often stoloniferous: fls. small, whitish, blue or violet, in raceme or spike terminating scape which is shorter or longer than lvs.; perianth without tube; stamens 6, hypogynous, filaments about as long as the anthers; ovary superior, 3-celled, style stout, stigma 3-toothed: fr. a berry-like pericarp with very few or often only 1 seed. (Li-riope: the nymph Liriope.)

**L. graminifolia**, Baker (*L. spicata*, Lour.). Lvs. all radical,  $\frac{1}{2}$  in. or less broad, 10–24 in. long, obtuse or very short-acute, several-nerved but usually one nerve more prominent either side of midrib: fls. many, whitish, violet to purple, in spike-like racemes on 1 or 2 scapes, about  $\frac{1}{4}$  in. across when expanded. China, Japan.—As usually accepted by botanists, the species includes many forms, differing in stature and width of lvs. The striped-leaved form is most frequent in cult.

**32. OPHIOPOGON**, Ker. Habit and looks of Liriope, and similarly used; species about half dozen, Himalayas and Japan: differs in technical characters as inferior ovary, the perianth arising nearly or quite from its top: filaments very short, less than the anthers: ovules 2 in each cell of ovary. (Ophiopogon: Greek *snake's beard*, probably in allusion to the spike of fls.)

Plant low and grassy: lvs.  $\frac{1}{2}$  in. or less broad.....1. *O. japonicus*  
Plant 1–3 ft.: lvs.  $\frac{1}{4}$  in. and more broad.....2. *O. Jaburan*

1. **O. japonicus**, Ker. Tufted little stoloniferous perennial with somewhat tuberous-thickened roots, used for sod-like edgings: lvs. many, rather rigid,  $\frac{1}{2}$  in. or less broad, 6–15 in. long, more or less curved: scape less than the lvs., bearing few to several violet or bluish-tinged drooping fls. about  $\frac{1}{4}$  in. long. Japan; and of wider range if held to include the several botanical forms usually referred to it.—There is a var. with striped lvs.

2. **O. Jaburan**, Lodd. More ornamental in foliage and bloom: lvs. nearly or quite flat,  $\frac{1}{4}$  to more than  $\frac{1}{2}$  in. broad, to 3 ft. long, obtuse or abruptly pointed, many-nerved: scape nearly as long as lvs., prominently bracted, the raceme 3–6 in. long: fls. white to lilac, in clusters in the raceme,  $\frac{1}{4}$  to nearly  $\frac{1}{2}$  in. long. (Jaburan: an oriental vernacular name.) Japan.—Vars. with striped lvs.

**33. KNIPHOFIA**, Moench (*Tritoma*, Ker). Probably 60–70 species in trop. and S. Afr., stout herbs with clumps of long radical lvs. and tall scapes of red and yellow drooping fls. in a terminal poker-like spike or dense raceme; probably only 2 species are cult. to any extent.—Plants with short stout mostly upright rootstock, and long cord-like roots: mostly acaulescent and lvs. all radical but in some species with a short caudex: fls. cylindrical or funnel-form with long tube much surpassing the small segms., on short pedicels articulated near top; stamens 6, hypogynous, equaling or exceeding perianth, outer 3 shorter, anthers versatile; ovary sessile, 3-celled, style long, stigma very small: caps. loculicidal. (Kniphof-ia: J. J. Kniphof, 1704–1765, professor at Erfurt, Germany.)—Garden forms are supposed to represent various hybrid origins. Two types are in common cult.—the large-fl. Uvaria type, and the small-fl. foliosa type.

Perianth 1–2 in. long; stamens scarcely if at all protruded.....1. *K. Uvaria*  
Perianth less than 1 in. long; stamens long-exserted.....2. *K. foliosa*

1. **K. Uvaria**, Hook. (*K. alooides*, Moench). **POKER-PLANT. TORCH-FLOWER.** Lvs. many, 2–3 ft., in radical clump, long-pointed, 1 in. or less broad: scape  $1\frac{1}{2}$ –4 ft. high, bearing many drooping imbricated fls. in late summer and autumn in a dense spike-like raceme 6–10 in. long, upper ones normally scarlet and lower ones yellow; perianth 1–2 in. long, the stamens barely exserted, style protruding. (Uvaria: Latin *uva*, a bunch of grapes.) S. Afr.—Grown in several colors and sizes, under the names *K. Pfitzeri*, *K. grandiflora* and others.

2. **K. foliosa**, Hochst. (*K. Quartiniana*, A. Rich.). Lvs. densely tufted, 2–3 ft. long, 2 in. or less broad, acuminate, sharply keeled, about length of the stout scape: fls. 1 in. or less long, in elongated racemes, slender-cylindrical, on very short bracted pedicels, the short small lobes obtuse or very short-acute; stamens much exserted. Trop. and S. Afr.—*K. pyramidalis* of the trade is the same or similar. Plants grown as *K. Saundersii* may be either this or No. 1.

34. **ASPHODELUS**, L. **ASPHODEL.** About a half-dozen species mostly of the Medit. region, perennial and annual, planted in the open.—Acaulescent: lvs. in radical clump, linear, strap-shaped or cylindrical and hollow: scape leafless, simple or somewhat branched, sometimes very short but mostly overtopping foliage: fls. white, racemose, funnelform; segms. 6, distinct or slightly connate at base, with prominent colored mid-nerve, ascending; stamens 6, all perfect, hypogynous, shorter than segms., filaments expanded at base and surrounding the sessile 3-celled ovary, anthers versatile; stigma 3-lobed: caps. loculicidal, seeds 2 or less in each cell. (Asphodelus: early Greek name.)

**A. albus**, Mill. Perennial, with 3-angled radical lvs., and leafless simple scape 3-4 ft. or more tall and surpassing the lvs.: fls.  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, many, white, in a dense raceme, the segms. spreading. Spain to E. Medit.—**A. ramosus**, L., has a branching more or less paniculate infl.

35. **ASPHODELINE**, Reichb. Very like Asphodelus, but distinguished by the leafy scape, fls. often yellow and 3 stamens sometimes abortive: genus of about 14 species in Medit. region. (Asphodeline: one of the asphodels.)

**A. lutea**, Reichb. (*Asphodelus luteus*, L.). **ASPHODEL.** Radical lvs. many, very narrow, channelled: scape 2-4 ft., erect, with many linear very long-pointed lvs., bearing a dense prominently bracted raceme 1-1½ ft. long: fls. yellow, fragrant, 1 in. long, with very long narrow wide-spreading segms. Medit.—This is the asphodel of the ancients.

36. **ANTHERICUM**, L. About 50 species as the genus is now usually limited, but with about twice that number if related groups are included; mostly in Afr., but 1 in Eu. and a few in Amer.: planted in borders and vases.—Rhizome short or none, the roots more or less fleshy or tuberous: lvs. radical, linear, mostly shorter than the slender leafless scapes: fls. rather small, white, slender-pedicelled, in a terminal usually open raceme; perianth rotate, the segms. distinct and 3-5-nerved; stamens 6, hypogynous or essentially so, filaments slender, anthers dorsifixed; ovary sessile, 3-celled, mostly many-ovuled, style filiform: caps. loculicidal, 3-celled but not sharply angled; seeds 3-angled. (Anthericum: Greek *flower hedge*.)

**A. liliago**, L. **ST.-BERNARD-LILY.** Lvs. many, narrow-linear, 6-12 in. long, shorter than the slender naked glaucous scapes: fls. several to many in a loose raceme, white,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long and 1 in. or less across, erect or spreading, on short pedicels subtended by lanceolate long-pointed bracts; segms. oblong, 3-nerved on back. (Liliago: ante-Linnæan substantive name.) Eu.

37. **CHLOROPHYTUM**, Ker. More than 50 species in the tropics of both hemispheres, grown mostly for foliage, but the fls. more or less ornamental; useful in vases.—Differs from Anthericum in bearing an acutely 3-angled caps., seeds flattened or disk-like, filaments often flattened upward, lvs. mostly broader and often petioled. (Chlorophytum: Greek *green plant*.)

**C. elatum**, R. Br. (*Anthericum elatum*, Ait.). Rhizome horizontal or oblique, with many thick roots: lvs. many, radical, relatively short and broad (12 in. or less long,  $\frac{3}{8}$ – $\frac{5}{8}$  in. broad but becoming longer and broader), long pointed, narrowed into petiole-like base: scapes exceeding the foliage, sometimes transformed into stolons and often bearing leafy clusters or offsets: fls. whitish, in a long open raceme,  $\frac{3}{4}$  in. across, rotate with narrow separate segms. S. Afr.—Known in cult. mostly in the striped-leaved forms, sometimes under such names as *Anthericum vittatum* and *A. picturatum*.

38. **EREMURUS**, Bieb. Some 20 perennials in W. and Cent. Asia, known by their towering racemose spikes of white, rose-colored or yellow bloom; a few species sometimes grown as border and specimen plants.—Root of strong parts and fleshy fibers: lvs. radical in a tuft or rosette, long and narrow, much shorter than the high naked scape: fls. bell-shaped or broader, the segms. distinct or lightly connate at base, 1- to several-nerved; stamens 6, hypogynous,



often exceeding the segms., filaments very slender, anthers dorsifixed; ovary sessile, 3-celled, style slender: caps. loculicidal, few- to many-seeded. (*Eremurus*: Greek, probably referring to the *solitary spike*.)

- Fls. pink, about  $1\frac{1}{2}$  in. across at full anthesis.....1. *E. robustus*  
 Fls. white, about 1 in. across.....2. *E. himalaicus*

1. *E. robustus*, Regel. Lvs. in dense basal rosette, strap-shaped, 2 ft. or so long, 1-2 in. broad, glabrous, with narrow cartilaginous border: scape 4-6 ft. and more, strict, unbranched: raceme 2-3 ft. long and 4-5 in. through, erect, with spreading jointed pedicels longer than the fls. and subtended by much shorter narrow-linear dry bracts; fls. about  $1\frac{1}{2}$  in. across when open, bright pink with brown keels on the oblong segms. which are about the length of the stamens. Cent. Asia.

2. *E. himalaicus*, Baker. Differs in smaller size: raceme shorter and 3-4 in. through: lvs. lightly ciliate on margins: fls. white with brown keels, about 1 in. across when open. W. Himalayas.

39. *PARADISEA*, Mazz. One perennial herb in Cent. and S. W. Eu., sometimes planted for its showy white fls.—Rhizome very short, the roots fascicled and fleshy: lvs. radical, narrow, about the length of the leafless but long-bracted scapes: fls. funnel-shaped, the 6 segms. distinct and narrow at base, 3-nerved; stamens 6, hypogynous, nearly equaling perianth, anthers versatile; ovary sessile, 3-celled, style slender and equaling the perianth, lightly 3-lobed: caps. many-seeded, loculicidal. (*Paradi-sea*: Greek *paradise*, a garden or garden of the future world.)

*P. Liliastrum*, Bert. (*Anthericum Liliastrum*, L.). ST.-BRUNO-LILY. Scapes 1-2 ft., slender: lvs. linear: fls. few to several in an open raceme,  $1\frac{1}{2}$ -2 in. long, tapering from top to base, the segms. not spreading or reflexed, bracts usually exceeding the pedicels. (*Liliastrum*: lily-like.)

40. *DRACÆNA*, L. DRACENA. Some 50 species of woody-stemmed plants in trop. regions, mostly in the eastern hemisphere, a few of which are grown under glass and bedded out for the ornamental foliage.—Sometimes tree-like, but mostly shrubby with single or few sts.: lvs. various, either long and sword-shaped or broad and more or less distinctly petioled, often marked with stripes, bands or dots, in mature plants usually crowded at summit of trunk or branches: fls. many, mostly in little clusters or fascicles arranged in panicles, small and not showy, greenish, whitish, yellowish; perianth funnelform or narrowly bell-shaped, with long or short tube, the 6 segms. nearly or quite alike and spreading or reflexed; stamens 6, inserted on tube or throat, filaments various, anthers versatile; ovary nearly or quite sessile, 3-celled, style slender, stigma capitate or somewhat lobed: fr. a globose berry, with 1-3 seeds. (*Dracæna*: Greek *female dragon*; the juice when thickened supposed to resemble dragon's blood.)—*D. Draco*, L., the Dragon-Tree of the Canary Isls., is famous for the great age and diameter it attains.

Lvs. only twice or less than thrice as long as broad, 3-8 or 9 in. long.

Blade marked with light dots.....1. *D. Godseffiana*

Blade crosswise banded.....2. *D. Goldieana*

Lvs. elongated, usually 10-12 in. and more.

Petiole part distinct and long; blade white-margined.....3. *D. Sanderiana*

Petiole part not distinct, the lf. only narrowed below, not white-margined.

Fl. about  $\frac{1}{2}$  in. long, yellow.....4. *D. fragrans*

Fl. exceeding  $\frac{1}{2}$  in., red without, white within.....5. *D. deremensis*

1. *D. Godseffiana*, Sander. St. slender, much branched: lvs. 2-3 at a node, short-petioled, oblong to oblong-ovate, 4-5 in. long and  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. broad, abruptly narrowed to point, marked with many irregular white spots: fls. in a short open raceme with minute bracts, greenish-yellow, very slender, about  $\frac{3}{4}$  in. long; stamens about the length of perianth. (Bears the name of Mr. Godseff, with the Messrs. Sander.) Upper Guinea.

2. *D. Goldieana*, Bull. St. short and woody: lvs. crowded, rather long-petioled, ovate, 4-9 in. long and 3-5 in. broad, abruptly short-pointed, banded transversely

with bright green and gray: fls. in dense globose heads with oblong-cuspidate bracts, white, 1 in. long; stamens somewhat shorter than tube. (Rev. Hugh Goldie, missionary in China, who sent the plant out.) Upper Guinea.

3. *D. Sanderiana*, Sander. Sts. tall and erect, nearly or quite simple: lvs. long-lanceolate, petiole 3 or 4 in., blade 5-9 in. long and  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. broad, gradually very long-pointed, either margin with broad longitudinal band of white and often other stripes farther in. (Bears the name of Messrs. Sander, plantmen, St. Albans, England, and Bruges, Belgium.) Cameroons.

4. *D. fragrans*, Ker. Tree-like, to 20 ft. and more, sometimes branched: lvs. crowded, long-oblong-lanceolate, 1-3 ft. long and 2  $\frac{1}{4}$ -4 in. broad, narrowed below sometimes abruptly and sometimes gradually, rather gradually narrowed into sharp point, green or variously striped and colored, erect, spreading or recurved: fls. fragrant, clustered on branches of an open panicle 1 ft. or more long with small white dry bracts; perianth yellowish, about  $\frac{1}{2}$  in. long, with narrow segms. about as long as the tube. Upper Guinea.—A common decorative plant, with lvs. of different sizes, directions, and color markings; the markings are mostly longitudinal stripes of yellow and greenish-white. Such hort. names as *D. Victoria*, *D. Lindeni*, *D. Massangeana*, belong here.

5. *D. deremensis*, Engler. Apparently not so tall as No. 4: lvs. 1  $\frac{1}{2}$ -2 ft. long and 2 in. broad, narrowed both ways, the point long and sharp: fls. in a large panicle on evident pedicels, dark red outside and white inside, with unpleasant odor; perianth above  $\frac{1}{2}$  in. long, one-half of which is tube. (Bears a geographical name.) Trop. Afr.—Grown usually as var. *Warneckii*.

41. **CORDYLINA**, Comm. (*Taetsia*, Medic.). Very like *Dracæna*, under which name the plants are known in cult.; they differ in technical characters, as many rather than single ovules in each cell, and solitary pedicels with 3 involucre-like bracts at base; species 10 or 12, in trop. parts of both hemispheres. (Cordyli-ne: Greek *club*, alluding to the thickened roots.)

|   |                         |
|---|-------------------------|
| Lvs. with distinct petioles.....                      | 1. <i>C. terminalis</i> |
| Lvs. without petioles.....                            |                         |
| Blade about 1 in. broad.....                          | 2. <i>C. stricta</i>    |
| Blade 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ in. broad..... | 3. <i>C. australis</i>  |

1. *C. terminalis*, Kunth. Stout, 3-10 ft., simple or somewhat branched: lvs. crowded or close together at end of st., lance-elliptic to lance-ovate to long-oblong, 1-2  $\frac{1}{2}$  ft. long and 2-5 in. broad, many-veined, narrowed to channelled clasping petiole, rather abruptly narrowed at apex to aristate point, green or variously colored: fls. alternate on the branches of an open panicle 1 ft. long, yellowish, white, lilac or reddish; perianth nearly or quite  $\frac{1}{2}$  in. long, the mostly erect segms. about as long as the tube. E. Himalayas to China and E. Indies.—The prevailing *dracæna* of cult., in many forms and colors of foliage. Some of the forms have gracefully arched lvs.; others have very narrow or very broad lvs. The color forms run to metallic hues, suffused tints of rose, purple, white, yellowish, bronze-green, sometimes spotted; striped forms also are common. The plant and its forms are known under such names as *Dracæna terminalis*, *Dracæna* and *Cordylina cannaefolia*, *Baptistii*, *metallica*, *nigro-rubra*, *norwoodiensi*, *Robinsoniana*, *Youngi*. Cultural forms arise readily and are likely to be given Latin-form names.

2. *C. stricta*, Endl. (*C. congesta*, Endl.). Slender plant, 6-12 ft.: lvs. 1-2 ft. long,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. broad, sword-shaped and sessile, not glaucous, margins obscurely denticulate, acuminate: fls. in terminal or lateral erect or cernuous panicles on very short pedicels subtended by bracts; perianth lilac,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, tube campanulate, inner segms. distinctly longer than the others. Subtrop. Australia.

3. *C. australis*, Hook. f. (*Dracæna australis*, Forst.). Tree-like, 15-40 ft., branching at maturity, trunk becoming 1-5 ft. diam. in its native country: lvs. densely rosulate at ends of branches, 1  $\frac{1}{2}$ -3 ft. long and 1  $\frac{1}{2}$ -2  $\frac{1}{2}$  in. broad, sword-shaped, contracted just above base but not petiolate, acute or acuminate, flat, green beneath, lateral veins fine: fls. in large terminal erect or drooping much-branched panicles, white, fragrant,  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam., on very short pedicels; segms. of equal length. New Zeal.—Vars. with striped and colored lvs. are in cult., under various names. This plant is apparently sometimes cult. as *indivisa*, but the true *C. indivisa*, Kunth, has very stiff and thick broader lvs. which are 2-6 ft. long, glaucous beneath, lateral veins heavy and conspicuous, red or yellow; it is also native in New Zeal.

## 26. AMARYLLIDACEÆ. AMARYLLIS FAMILY

Upwards of 70 genera and 800 species in temp. and warm regions of the world, largely in S. Afr., S. Amer., and Medit. regions; many are showy garden plants.—Closely allied to Liliaceæ, from which it is technically distinguished by the inferior ovary, and to Iridaceæ from which it differs in prevailing 6 stamens and the absence of iris-like fls.; many of the cult. kinds have lily-like fls. and may be known as lilies: perennial herbs, either caulescent or acaulescent, bulbous, rhizomatous or fibrous-rooted: lvs. radical or cauline, alternate, mostly narrow, entire: fls. usually bisexual, the perianth of 6 parts or lobes, arising from a spathe-like bract or bracts, at least the 3 inner parts simulating a corolla; stamens usually 6, inserted in the throat or on base of segms., the anthers introrse; style long; ovary inferior (below the perianth) or at least partly so, 3-celled, each cell with many or sometimes only few ovules which are superposed (one above the other) or collateral: fr. a caps. or sometimes baccate, mostly loculicidal.—For the most part, the amaryllids are grown as pot specimens or are planted out for summer; marked exceptions are the narcissi, galanthus, and leucojum, and in the S. the crinums and others are permanently planted in yards. Many of them are seen mostly in summer window-gardens and on porches and in conservatories, as vallota, sprekelia, amaryllis, hippeastrum, clivia. Some of the groups are much hybridized; cult. kinds are usually poorly represented in herbaria; therefore the species are often confused. (*E, F, G*, in Fig. 8, page 151.) Aside from the genera here described, the following are to be looked for:

**STERNBERGIA lutea**, Roem. & Schult., of the Medit. region, an autumn-blooming little plant much like a yellow-fl. Zephyranthes: bulbous: lvs. strap-shaped, 1 ft. long: fl. solitary, among the lvs., with very short tube and oblong veiny erect segms. about  $1\frac{1}{2}$  in. long.

**AMMOCHARIS falcata**, Herb., S. Afr., much like Amaryllis but stamens erect rather than declinate, segms. narrow, clawed and reflexing: blooms in summer or autumn or may be had in winter under glass: fls. bright red and fragrant, 20–40 in an umbel on a flattened solid scape about 1 ft. long: lvs. preceding the fls., strap-shaped.

**ANIGOZANTHOS Manglesii**, D. Don, Australia and sometimes seen in Calif., has odd long-tubular woolly fls. 3 in. long, red at base and otherwise green, in a short 1-sided spike-like red-woolly raceme: segms.  $\frac{1}{2}$  in. long, not spreading, pubescent inside; anthers included, appendaged. By some authors placed in the family Hæmodoraceæ.

A. Plants known as "bulbs:" fls. mostly lily-like, solitary or umbellate, on leafless scapes or directly from the underground bulb; style usually long: lvs. soft in texture, except in Eucharis and certain species of Hymenocallis, linear or sword-shaped. (Polianthes, the tuberose, is not to be sought here.)

B. Perianth without crown at throat (although small scales are present in some species); filaments not dilated or united to form a cup.

C. Anthers versatile, attached at back (dorsifixed).

D. Tube of perianth none or short, not equaling segms. (at least not in the usual cult. species).

E. Fls. umbellate, often close but not a dense head.

F. Foliage not persistent or evergreen, appearing often before or after flowering: plant truly bulbous.

G. Umbel not dense; fls. 2 in. or more long (except in Nerine), the segms. lanceolate or broader.

H. Peduncle (scape) solid.

I. Pedicels short, 2 in. or under.

J. Stigma capitate and prominent: ovules many in each cell.

JJ. Stigma scarcely thicker than style: ovules few . . . . . 1. AMARYLLIS

JJJ. Stigma 3-lobed: ovules few . . . . . 2. LYCORIS

II. Pedicels long, 4 in. or over . . . . . 3. NERINE

HH. Peduncle (scape) hollow . . . . . 4. BRUNSVIGIA

I. Segms. with cushion-like callus or thickening between at base . . . . . 5. VALLOTA

- ii. Segms. without callus (sometimes scales in throat of perianth)..... 6. HIPPEASTRUM
- gg. Umbel much crowded; fls. (in ours) about 1 in. long, the segms. linear or nearly so..... 7. HÆMANTHUS
- ff. Foliage persisting, evergreen: plant with cord-like roots and only imperfectly bulbous..... 8. CLIVIA
- ee. Fls. solitary.
  - f. Position of fl. horizontal; perianth-segms. in 2 sets of 3 each (fl. gaping)..... 9. SPREKELIA
  - ff. Position of fl. erect or nearly so; perianth practically regular..... 10. ZEPHYRANTHES
- dd. Tube of perianth prominent, long and slender, equaling or usually much exceeding segms.: peduncle (scape) solid..... 11. CRINUM
- cc. Anthers erect, attached at or near base (basifixed).
  - d. Segms. of perianth all alike..... 12. LEUCOJUM
  - dd. Segms. unlike, the 3 inner connivent..... 13. GALANTHUS
- bb. Perianth without crown, but filaments broadened or appendaged to form a staminal cup, which is sometimes adnate to tube.
  - c. Segms. of perianth broad and wide-spreading, length little greater than breadth: lvs. broad and petioled..... 14. EUCHARIS
  - cc. Segms. lanceolate, usually much longer than broad: lvs. mostly sword-shaped, in No. 16 sometimes broader.
    - d. Ovules many in each cell, one above another..... 15. PANCRACTIUM
    - dd. Ovules 2 in each cell, side by side..... 16. HYMENOCALLIS
- bbb. Perianth with crown, which simulates an extra corolla, outside the stamens..... 17. NARCISSUS
- aa. Plants with fleshy fibrous roots, small soft lvs. on st., and fls. mostly spotted, in simple or compound terminal umbel: style filiform..... 18. ALSTROEMERIA
- aaa. Plants with rhizomes or tuberous rootstock: fls. not umbellate, in racemes, spikes or panicles; style filiform or subulate: st. leafy or strongly bracted, the lvs. stiff or ordinary.
  - b. Lvs. thick, stiff and usually large and spiny, in a heavy basal rosette: perianth with short tube..... 19. AGAVE
  - bb. Lvs. ordinary, linear and channelled, not in a rosette: perianth with long curved tube..... 20. POLIANTHES
- aaaa. Plants with short thick rhizome, radical plicate lvs. not in rosette, and fls. in a dense head or spike among the foliage on a mostly short peduncle or scape, not showy ("foliage plant"), with short columnar style and ovary produced into a beak resembling a perianth-tube..... 21. CURCULIGO

1. **AMARYLLIS**, L. One species in S. Afr., with several forms in cult.—Bulbous: lvs. appearing after the fls., strap-shaped: perianth funnel-shaped, with short tube and nearly equal oblong acute ascending segms.; stamens declinate, inserted at throat, not exerted; ovary oblong, with many superposed ovules in each of the 3 cells; style slender and declinate, with capitate stigma: caps. globose, irregularly bursting, maturing few globose seeds. (*Amaryllis*: classical name, applied to a woman by early writers.)

**A. Belladonna**, L. **BELLADONNA-LILY**. Fls. summer and autumn, rose-red, fragrant, 3–3½ in. long, lily-like, several in an umbel on a solid compressed peduncle or scape 1–2 ft. or more high; segms. connivent below, ½ in. or more broad at widest. (*Belladonna*: *handsome lady*, the name bestowed by Linnæus.)—Kinds are cult. with fls. purple, white fading to blush, white-striped, and otherwise. The plants usually grown as *Amaryllis*, however, are of other genera, particularly *Hippeastrum* which has a hollow scape, often scales at the throat, stigma sometimes 3-lobed, caps. regularly loculicidal, seeds usually flattened.

2. **LYCORIS**, Herb. About a half-dozen species from China and Japan, frequently planted for summer and autumn bloom and to some extent under glass.—Bulbous: scape solid: lvs. usually after or before the fls., strap-shaped or narrower: fls. yellow or red, few, several or many in an umbel terminating the scape; perianth funnel-shaped, somewhat irregular, the cylindrical tube short but expanded at top, throat sometimes bearing scales, the segms. clawed, nearly equal; stamens inserted near throat, declinate; style long, with a very small capitate stigma; ovules few in each cell. (*Lycoris*: a name in Greek mythology.)

- Fls. yellow or orange..... 1. *L. aurea*
- Fls. red or lilac (rarely varying to white).
  - Stamens much exerted..... 2. *L. radiata*



Stamens included or about equaling segms.

Throat of perianth with scales. .... 3. *L. squamigera*  
Throat without scales. .... 4. *L. sanguinea*

1. *L. aurea*, Herb. (*Amaryllis aurea*, L'Her.). Fls. yellow, in summer, not fragrant, following the glaucous sword-shaped lvs.; perianth large, 3 in. long, tube  $\frac{3}{4}$  in. or less, with scales in the throat, segms. more or less crisped or wavy,  $\frac{1}{2}$  in. or less broad; stamens and style mostly exceeding perianth. China.

2. *L. radiata*, Herb. (*Amaryllis radiata*, L'Her.). Fls. bright red (a white form), not fragrant, in autumn, linear and glaucous lvs. appearing later; perianth small, about  $1\frac{1}{2}$  in. long, tube very short, segms. crisped, wide-spreading and recurved; stamens twice exceeding the segms.; style protruded. China, Japan.

3. *L. squamigera*, Maxim. (*Amaryllis Hallii*, Hort.). Fls. rose-lilac or pink, in summer, fragrant, following the strap-shaped lvs.; perianth large, 3 in. long, the tube  $\frac{1}{2}$  in. or more long and with scales in throat, the segms. obtuse and crisped and  $\frac{1}{2}$  in. or more broad; stamens nearly or about as long as segms.; style exserted. Japan.

4. *L. sanguinea*, Maxim. Fls. bright red, erect, not fragrant, in summer, preceding the linear lvs.; perianth medium size, 2 in. long more or less, the tube  $\frac{1}{2}$  in. long and not scaly in throat, the segms. erect and very narrow, not crisped; stamens shorter than segms.; styles exserted. Japan.

3. **NERINE**, Herb. (*Imhofia*, Heist.). Fifteen recognized species in S. Afr., one of which is frequently grown for autumn bloom.—Bulbous: lvs. strap-shaped, produced with the fls. or after them: fls. in shades of red, on solid scape; perianth funnelform, erect or somewhat declined, tube practically none; segms. all alike, falcate, usually crisped; stamens on base of segms., usually exserted, 3 shorter than the others; ovary globose, with few superposed ovules in each cell; stigma obscurely 3-lobed: caps. loculicidal, 3-valved; seeds globose. (Neri-ne: a nereid.)

**N. sarniense**, Herb. (*Amaryllis sarniensis*, L.). GUERNSEY-LILY, from place of its early cult., recorded in the name *sarniense*. Lvs. linear, after fls.,  $\frac{3}{4}$  in. or less broad: scape somewhat flattened, 12–18 in. long: fls. many in a close umbel, on pedicels 1–2 in. long; perianth about  $1\frac{1}{2}$  in. long, crimson; segms. oblanceolate,  $\frac{1}{2}$  in. or less broad, falcate, slightly crisped; filaments bright red, exceeding segms.—There are color forms and other variants.

4. **BRUNSVIGIA**, Heist. About a dozen species of S. African bulbs (1 trop. Afr.), one of which is frequently grown.—Summer- and autumn-flowering, differing from *Amaryllis* in having 3 stamens shorter than others, ovary top-shaped, caps. regularly loculicidally 3-valved, seeds flattened: lvs. appearing after fls., strap-shaped or tongue-shaped: fls. 2–3 in. long, umbellate, funnel-form, decurved or nearly erect, red or pink, on spreading pedicels 6–12 in. long, the segms. nearly equal and falcate; stamens inserted in the tube, more or less declinate, 3 shorter than the others; ovules numerous in each cell; style declinate and stigma capitate. (Brunsvig-ia: the House of Brunswick.)

**B. Josephinæ**, Ker (*Amaryllis Josephinæ*, Red.). JOSEPHINES LILY (the Empress Josephine purchased the original bulb). Bulb very large: lvs.  $1\frac{1}{2}$ –2 in. broad, 2–3 ft. long, ribbed: scape stout,  $1\frac{1}{2}$  ft. long, solid: fls. many in an open umbel and long pedicels, bright red; perianth about 3 in. long, the curved tube only about  $\frac{1}{2}$  in. long; stamens equaling the lanceolate segms.

5. **VALLOTA**, Herb. One species in S. Afr., grown for summer bloom.—Bulbous: lvs. several to many, appearing with the fls., strap-shaped, 1–2 ft. long and 1 in. or more broad: fls. few or several in an umbel, scarlet, the spathe-valves 2–3 in. long; perianth erect, funnelform, with prominent tube and equal segms. connected at base by callus; stamens inserted in top of tube; ovary oblong, each cell with many ovules; style slender; stigma capitate and faintly 3-notched: caps. loculicidally 3-valved, the compressed seeds with wing at base. (Vallo-ta: Pierre Vallot, French botanist.)

**V. speciosa**, Voss (*Crinum speciosum*, L. f. *Vallota purpurea*, Herb. *Amaryllis purpurea*, Ait.). SCARBOROUGH-LILY. Lvs. dying in autumn: scape hollow, 2-3 ft. high, equaling or exceeding the lvs.; pedicels 1-2 in. long: fls.  $2\frac{1}{2}$ -3 in. across.—There are color forms, one with white fls., others with fls. 4-5 in. across, marked with white blotches or eye.

**6. HIPPEASTRUM**, Herb. The American representatives of *Amaryllis*, and usually grown under that name for spring and summer bloom or late winter under glass; 60-70 species in trop. parts of western hemisphere.—Bulbous: lvs. linear or strap-shaped, sometimes with the fls. and sometimes succeeding them: fls. large and lily-like (in cult. species), red or whitish and sometimes white-striped, few or several in an umbel on a hollow scape; perianth funnel-shaped, horizontal or declinate, tube short in the cult. kinds, sometimes with minute scales in the throat, segms. equal or the inner ones narrower; stamens inserted in throat, somewhat declinate; ovules many, superposed; stigma capitate or 3-parted: caps. globose, loculicidally 3-valved, seeds usually flattened. (*Hippeastrum*: Greek *knight* or *horse*, and *star*: of no obvious application.)—Most of the *hippeastrums* in cult. are probably hybrids (known as “hybrid *amaryllis*”). The species have been extensively crossed and re-crossed since Johnson, a watchmaker in Lancashire, hybridized *H. Reginæ* and *H. vittatum*, producing a plant known as *H. Johnsoni*, Bury. The cult. species are of the strap-leaved section.

Stigma 3-branched.....1. *H. vittatum*

Stigma capitate, not branched or parted but sometimes obscurely 3-notched.

Tube of perianth  $\frac{1}{2}$  in. or less long.....2. *H. Reginæ*

Tube more than  $\frac{1}{2}$  in. long.

Segms. tessellated or cross-barred.....3. *H. reticulatum*

Segms. not tessellate or checked.....4. *H. puniceum*

**1. H. vittatum**, Herb. (*Amaryllis vittata*, Herb.). Bulb large, globose: lvs. several, long, green, appearing with or after the fls.: fls. few and large, 4-6 in. long and nearly as broad, red-and-white striped, tube about 1 in. long with obscure little crown at throat; segms. long-obovate, exceeding the stamens; style equaling or exceeding perianth. Peruvian Andes.—The common commercial hybrid *amaryllises* are of this type or group.

**2. H. Reginæ**, Herb. (*Amaryllis Reginæ*, L.). Bulb large, globose: lvs. developing after the fls., large and broad, much narrowed at base: fls. few and large, 4-5 in. long, bright red not striped, but throat with large whitish star but without crown; tube  $\frac{1}{2}$  in. or less long; segms. obovate and acute, exceeding stamens; stigma capitate in form but obscurely 3-lobed or -notched. Mex. and W. Indies to S. Amer.

**3. H. reticulatum**, Herb. (*Amaryllis reticulata*, L'Her.). Bulb medium, nearly globose: lvs. few, thin, appearing with fls., oblanceolate, 2 in. broad toward top: fls. few, horizontal or declined, about 4 in. long, tube 1 in. or more long and slender below, without crown; segms. obovate, narrowed to base, rose-pink, beautifully cross-barred with darker rose; stamens shorter than perianth; stigma capitate but obscurely 3-lobed or -notched. Brazil.—Var. *striatifolium*, Herb., has broad lvs. with prominent white rib.

**4. H. puniceum**, Urban (*H. equestre*, Herb. *Amaryllis equestre*, Ait.). Bulb medium, globose, producing runners or stolons: lvs. few, fully developed after fls., strap-shaped: fls. few, 4-5 in. long, tube 1 in. or more long and greenish and with obscure little crown in throat; segms. red or salmon-red and lighter colored toward base, the inner ones narrower; stamens shorter than perianth; stigma capitate but obscurely 3-lobed or -notched. Mex. and W. Indies to S. Amer.

**7. HÆMANTHUS**, L. Probably more than 60 species, in trop. and S. Afr., one or two sometimes grown in pots for summer and autumn bloom.—Bulbous, with broad mostly obtuse lvs. more or less narrowed at base: scape solid, somewhat flattened: fls. many in a dense head subtended by a whorl of spathes, red or white; perianth straight, erect or spreading, with tube shorter than the narrow (linear or lanceolate) equal segms.; stamens inserted at throat,

often longer than perianth and sometimes strongly exserted; ovary globose, each cell with solitary or paired ovules; stigma minutely 3-lobed: fr. berry-like, indehiscent; seed or seeds globose. (Hæmanthus: *blood flower*, from Greek words.)

**H. coccineus**, L. Bulb large: lvs. 2, thick and fleshy, appearing early in season, to 2 ft. long and 6 or 8 in. broad: scape shorter than lvs.: head or umbel 2-3 in. diam., with several large obtuse bright red bracts or spathe-valves; fls. red, about 1 in. long, very thin in texture, segms. linear; stamens much exserted. S. Afr.—Other species are now and then grown, as **H. Katharinæ**, Baker (named after Mrs. Katharine Saunders), which has 3-5 thin lvs. appearing at the same time as the fls. and not exceeding or not equaling the head of bright red fls.; spathe-valves lanceolate-pointed, soon falling.

**8. CLIVIA**, Lindl. Three species in S. Afr., one frequent in greenhouses for spring and summer bloom.—Plants with fleshy roots and bulb-like parts formed of the expanded lf.-bases: lvs. many, evergreen, distichous: fls. several or many, in a close but not compact umbel, red-yellow or scarlet, not fragrant, subtended by several imbricated green spathe-valves; perianth funnelliform, the tube short, 3 outer segms. narrower than others; stamens inserted in throat, about equaling segms.; ovary globose, with 5 or 6 ovules in each cell; style 3-lobed: fr. a red berry, with large globose seeds. (Clivia: a Duchess of Northumberland, of the Clive family.)

**C. miniata**, Regel (*Imantophyllum miniatum*, Hook.). Strong plant, spreading and filling a large pot or tub: lvs. thick and glossy, broadly strap-shaped, 1-2 in. broad: fls. 10-20 and more, erect, scarlet with yellow inside, pedicels 1-2 in. long; perianth 2-3 in. long; inner segms. broadly obovate and obtuse, a little exceeding the stamens; style somewhat protruded.

**9. SPREKELIA**, Heist. One species in Mex., often cult.—Bulbous: lvs. narrow, with the bloom: fl. 1, terminating the scape; perianth without tube but 3 lower segms. rolled together forming a horizontal cylinder from which the narrow segms. depend, the other 3 segms. erect or nearly so; stamens in the cylinder, attached to base of segms., exserted, with large hanging versatile anthers; ovary top-shaped, 6-angled, each cell with many superposed ovules; style 3-parted: caps. 3-valved; seeds disk-like, narrowly winged. (Sprekelia: J. H. von Sprekelsen, who sent the plant to Linnæus and wrote on plants; died 1764.)

**S. formosissima**, Herb. (*Amaryllis formosissima*, L.). JACOBÆAN-LILY. Spring bloomer, with several lvs. nearly equaling or exceeding the hollow scape: fls. from an erect colored 2-toothed spathe, the perianth 3-4 in. long; upper segms. sometimes 1 in. broad, others narrower.

**10. ZEPHYRANTHES**, Herb. (*Atamosco*, Greene). ZEPHYR-LILY. More than 50 species in the warmer parts of western hemisphere, low plants with grassy lvs. planted in borders and sometimes in pots and window-gardens; bloom in spring, summer, autumn.—Bulbous: lvs. few to several, usually appearing with the blossoms: fl. 1 to each scape (which is hollow), white, yellow, pink, or red, from a simple tubular spathe 2-notched at apex; perianth erect or somewhat inclined, funnelliform, with short or long tube, the segms. about equal; stamens inserted at throat or in tube, somewhat unequal; ovules many in each cell; stigma 3-parted or -notched: caps. nearly globose, loculicidally 3-valved; seeds more or less flattened. (Zephyranthes: Greek *wind flower*.)

Stigma deeply 3-parted or -branched.

Fls. white, sometimes purplish-tinged.....1. *Z. Atamosco*

Fls. rose-red.....2. *Z. carinata*

Stigma obscurely 3-lobed or -notched.....3. *Z. candida*

**1. Z. Atamosco**, Herb. (*Amaryllis Atamosco*, L.). ATAMASCO-LILY (*Atamosco*, an Indian word or name). Spring-flowering: bulb about 1 in. diam.: lvs. appearing

with the fls., narrow-linear, 1 ft. more or less long: fl. pure white varying to purple-tinged, on a pedicel shorter than the 2-cleft spathe; perianth 2-3 in. high, with tube longer than segms.; stamens shorter than limb of perianth; style prominent, trifid. Pa. to Ala. and Fla.

2. *Z. carinata*, Herb. (*Z. rosea*, Hort., not Lindl.). Spring and summer: bulb 1 in. diam.: lvs. with the fls., linear, 12 in. or less long: fl. rose-red or pink, on a pedicel shorter or longer than the colored spathe; perianth  $2\frac{1}{4}$ -3 in. long, the tube prominent, the segms. obovate, obtuse or nearly so, veiny,  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad; stamens half or more length of limb; style prominent and strongly trifid. Cuba, Jamaica, Mex. and S.

3. *Z. candida*, Herb. Summer and autumn: bulb 1 in. diam, with prominent neck: lvs. with the fls. and remaining through winter in mild climates, linear, 1 ft. more or less long: fl. white, often tinged rose outside, on pedicel included in spathe; perianth 2 in. long, without tube; segms. obtuse or short-acute,  $\frac{1}{2}$  in. or less broad; stamens much shorter than segms.; style somewhat exceeding stamens; stigma slightly 3-notched. La Plata region, S. Amer.

11. **CRINUM**, L. Perhaps 80-100 species in the warm temp. and trop. parts of both eastern and western hemispheres; most of them are striking plants of much beauty; many are planted in warm countries by collectors, but those in general cult. are few; sometimes called "crinum lilies;" mostly summer-bloomers.—Bulbous: lvs. mostly persistent or evergreen, often broad and thick, strap-shaped or sword-shaped, not narrowed to petiole: fls. white, but striped, tinged or overlaid with red, few or many in an umbel subtended by 2 large broad spathe-valves, the pedicels short, scape solid; perianth large, funnellform or salverform, with a long cylindrical straight or curved tube equaling or exceeding the equal or nearly equal mostly narrow segms.; stamens inserted at throat, filaments long and usually declinate; ovary globose, oblong or oval, with few (sometimes only 2) ovules in each cell; style long and slender; stigma small, capitate: caps. bursting irregularly; seeds large and green. (Crinum: Greek name for a lily.)—The native *C. americanum*, L., Swamp-Lily of the southern states, is sometimes planted: white-fl'd.; segms. very narrow, wide-spreading, on scapes 1-2½ ft. high.

Tube of perianth straight or essentially so, standing nearly or quite erect; perianth salverform.

Fls. white.....1. *C. asiaticum*

Fls. red or tinged red, at least outside.

Segms. of perianth equaling tube.....2. *C. amabile*

Segms. half length of tube.....3. *C. erubescens*

Tube of perianth naturally curved; perianth funnellform.

Fls. sessile or nearly so in the umbel.

Umbel with few fls., usually 3-6, or sometimes 8.

Lvs. scabrous on margin but not crisped.....4. *C. scabrum*

Lvs. denticulate and much crisped on margin.....5. *C. Sanderianum*

Umbel with many fls., 10 or more.....6. *C. zeylanicum*

Fls. on pedicels 1 in. or more long.

Lvs. scabrous on the margin.....7. *C. longifolium*

Lvs. not scabrous on margin.

Scape green; fls. pink.....8. *C. Moorei*

Scape glaucous; fls. darker.....9. *C. Powellii*

1. *C. asiaticum*, L. A variable species of trop. Asia, hardy along the Gulf Coast, forming clumps of tropical-looking foliage and flowering continuously for a long season: bulb long and columnar, 1 ft. or so long: lvs. many and closely placed, 3 ft. or more long and 3-4 in. broad, gradually tapering to a sharp point, light bluish-green: fls. pure white, very fragrant, borne a little above foliage, 20 or more on 2-edged stout scape, pedicels 1 in. or less long, spathe-valves 3-4 in. long; tube erect, 3-4 in. long; segms. linear, about 3 in. long; stamens 2 in. long, red: seeds large and fleshy.—Var. *sinicum*, Baker, ST.-JOHNS-LILY, is a big form with broader undulate lvs., stouter scape, tube and segms. longer.

2. *C. amabile*, Donn. Bulb small, the neck 1 ft. or more long: lvs. many and large, strap-shaped, 3-4 ft. long and 3-4 in. broad, green, smooth on margin: fls. bright red on tube and center of segms., otherwise white or bluish, exceedingly fragrant, 20 or more on a stout flattened scape 2-3 ft. long, pedicels 1 in. or less long, spathe-valves 4-5 in. long, red; tube straight, cylindrical, 3-4 in. long; segms.



4-5 in. long,  $\frac{1}{2}$  in. or so broad; stamens slender and prominent but shorter than the curved segms. Sumatra.—Seen far S.

3. *C. erubescens*, Ait. Bulb 3-4 in. diam.: lvs. many, strap-shaped, 2-3 ft. long, 2-3 in. broad, thin and close-veined, margin slightly rough: fls. rather few, usually 4-6 but sometimes 10-12, pure white inside and purplish red outside with a light pink rib, fragrant, on a scape 2-3 ft. long, the pedicels very short or none, the green spathe-valves 3 in. long; tube straight and erect, 5-6 in. long; segms. lanceolate, becoming reflexed, half as long as tube; filaments bright red, not exerted. Trop. Amer.—Common in gardens far S.

4. *C. scabrum*, Herb. Bulb large: lvs. several to many, strap-shaped, 2-3 ft. long and 2 in. or less broad, closely veined, firm in texture, the edge rough to the feel: fls. few, white but with crimson keels and stripes, amaryllis-like, sessile or nearly so, the broad spathe-valves 2-3 in. long; tube curved, 3-5 in. long; segms. about 3 in. long, oblong, acute; stamens not exceeding segms. Trop. Afr.

5. *C. Sanderianum*, Baker. Lvs. thin, 2 ft. or less long,  $1\frac{1}{2}$  in. or less broad, the edge denticulate and crisped: fls. white, keeled bright red, larger than in No. 4, sessile, the spathe-valves 3-4 in. long; tube curved, 5-6 in. long; segms. 3-4 in. long, oblong-lanceolate and acute. (Named after Sander & Co., page 176.) Trop. Afr.—Frequent far S.

6. *C. zeylanicum*, L. (*Amaryllis zeylanica*, L.). Bulb large: lvs. several, strap-shaped, thin, 2-3 ft. long, 3-4 in. broad, slightly rough on edge: fls. white with red stripes, very fragrant, 10 or more in an umbel on tall purple scapes, pedicels very short, spathe-valves reddish, 3-4 in. long; tube curved, 3-6 in. long; segms. 3-4 in. long, oblong-lanceolate, acute, 1 in. broad; stamens declinate, shorter than segms. Trop. Asia and Afr.—Common in yards far S.

7. *C. longifolium*, Thunb. (*C. capense*, Herb. *Amaryllis longifolia*, L.). Hardy in middle states: bulb flask-shaped, with short gradual neck: lvs. several to many, strap-shaped, firm and glaucous, 2-3 ft. long and 2-3 in. broad, rough-edged: fls. pink with deeper red outside (a white var.), 8-12 or more on pedicels 1-2 in. long, spathe-valves 3 in. long; tube curved, cylindrical, 3-4 in. long; segms. about equaling tube, oblong, acute, 1 in. or less broad; stamens nearly equaling segms. S. Afr.

8. *C. Moorei*, Hook. f. Bulb very large, 6-8 in. diam., with stem-like neck 10-12 in. or more long: lvs. long, thin and wavy, bright green, strap-shaped, 2-3 ft. long and 3-4 in. broad, not ciliate or rough on margin: fls. rosy or pinkish-red (a white var.), very fragrant, 4-10 on a green scape, pedicels  $1\frac{1}{2}$ -3 in. long, spathe-valves large and thin; tube curved, 3-4 in. long; segms. length of tube, oblong and scarcely acute, 1- $1\frac{1}{2}$  in. broad; stamens declinate, much shorter than segms., the filaments pink. (Named after Dr. David Moore, Glasnevin, Ireland.) S. Afr.

9. *C. Powellii*, Baker. Popular hardy plant, hybrid of *C. longifolium* and *C. Moorei*: bulb globose, with short neck: lvs. sword-shaped, green, smooth on edge: fls. dark rose-color, about 8 on a flattened glaucous scape, pedicels about 1 in. long; tube curved, about 3 in. long; segms. oblong-lanceolate and acute, 4 in. long, 1 in. broad.

12. **LEUCOJUM**, L. **SNOWFLAKE**. Nine or 10 species of small hardy bulbous plants grown in the open for spring, and some of them for autumn, bloom; Eu. and Medit. region.—Bulb small: scape hollow: lvs. few to several, linear and strap-shaped, appearing with the fls. in the vernal species and after them in the autumnal species: fls. 1 or several in a small umbel, white tinged green or red, from a single spathe-valve, cernuous or declined; perianth without tube, segms. all alike; stamens inserted on ovary or hypanthium, filaments short, anthers erect and basifixed; ovules many, one above another; stigma small and capitate: caps. 3-valved loculicidally; seeds nearly globose. (*Leucojum*: old Greek name, etymologically *white violet*.)

Pedicel about as long as ovary and much shorter than spathe: fl. usually

1, in early spring. . . . . 1. *L. vernum*

Pedicel slender, equaling or exceeding spathe: fls. usually more than 1.

Perianth white, tipped green: middle to late spring. . . . . 2. *L. æstivum*

Perianth white, tinged red: autumn. . . . . 3. *L. autumnale*

1. *L. vernum*, L. Lvs. short, becoming 6-9 in. long,  $\frac{1}{2}$  in. or less broad, obtuse: scape 12 in. or less, usually bearing 1 declined or cernuous short-pedicelled fl.: segms.  $\frac{3}{4}$  in. long and  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, making a rather heavy fl., white tipped green: very early spring. Cent. Eu.

2. *L. æstivum*, L. Lvs. 12-18 in. long and  $\frac{1}{2}$  in. broad, narrowed above but short-obtuse at apex: scape about 12 in. bearing 2-8 fls. on long drooping pedicels: segms.  $\frac{3}{4}$  in. or less long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, making a rather light fl., white tipped green: mid to late spring. Cent. and S. Eu.

3. *L. autumnale*, L. Lvs. filiform, mostly appearing after the fls.: scape very slender, 9 in. or less, bearing 1-3 fls. on long cernuous pedicels: segms.  $\frac{1}{2}$  in. or less long, 5-7-nerved, white tinged red: autumn. Medit. region.

13. *GALANTHUS*, L. SNOWDROP. Very like *Leucojum*, but scape solid, lvs. only 2 or 3, fl. 1, segms. in two series, the 3 inner ones shorter, connivent and erect; 8-10 little hardy plants, grown for very early spring bloom (one unusual species autumnal); Eu. and W. Asia. (*Galanthus*: Greek *milk flower*.)

Inner segms. green only at sinuses. . . . . 1. *G. nivalis*  
Inner segms. green on lower half as well as in sinuses. . . . . 2. *G. Elwesii*

1. *G. nivalis*, L. The common snowdrop, blooming in earliest spring, in several forms: lvs. linear and glaucous, about  $\frac{1}{4}$  in. wide and becoming 8-9 in. long: fl. 1. declined or nodding on a slender pedicel, the scape usually less than 1 ft. high; outer segms. white,  $\frac{1}{2}$ -1 in. long, veiny, obtuse or nearly so; inner segms. half as long, emarginate, white with green at the sinuses. Cent. and S. Eu. to Caucasus.

2. *G. Elwesii*, Hook. f. GIANT SNOWDROP. Plant and fls. larger: inner segms. green at sinuses and also on the lower half: several forms. (Named for the late H. J. Elwes, England, who collected it near Smyrna.) Asia Minor.

14. *EUCCHARIS*, Planch. Six or 8 species of Colombia, one of which is common in greenhouses and as a pot-plant.—Bulbous: lvs. with expanded blade, narrowed into petiole: fls. pure white, showy and large, few in an umbel on a mostly terete scape; outer spathe-valves 2 and ovate-lanceolate, inner several to many and linear; perianth with spreading equal segms., and a cylindrical somewhat curved tube that is expanded at top; stamens inserted at throat, shorter than segms., the filaments broadened or appendaged to form a cup; ovules mostly many in each cell; stigma 3-lobed: caps. 3-lobed, becoming dehiscent. (*Eu-charis*: Greek *very graceful*, well applied to these pleasing plants.)

*E. grandiflora*, Planch. (*E. amazonica*, Lind.). Sometimes called Amazon-Lily, although from the Andes of Colombia. Bulb 2 in. diam., tapering to neck: lvs. few to each st., thin, the blade oblong or oval, 4-6 in. broad and twice or more as long, acuminate, petiole slender and equaling or exceeding the blade: scape 1-2 ft., bearing 3-6 fragrant fls. on short pedicels: perianth wide open, the segms. 1-1 $\frac{1}{2}$  in. broad and little longer, making a fl. about 2 $\frac{1}{2}$ -3 in. across; tube slender, 2 in. long above the prominent globose ovary; staminal cup protruded and prominent.

15. *PANCRATIUM*, L. Species 14 or more in subtemp. and trop. regions of Old World, little cult. in N. Amer.—Bulbous: lvs. linear or strap-shaped: fls. white, few or many in an umbel on a solid scape, the outer spathe-valves 2 and lanceolate; perianth with a cylindrical tube broadening at the top, the segms. narrow, equal and spreading; stamens inserted at throat, the filaments united in a cup at base but free above, anthers versatile; ovules many in each cell, one above another; stigma capitate but somewhat 3-lobed but not divided or branched: caps. loculicidal, 3-valved. (*Pancra-tium*: Greek *all-powerful*, from supposed medicinal virtues.)

*P. maritimum*, L. Bulb globose, tapering into neck: lvs. evergreen, linear, glaucous, 2 2 $\frac{1}{2}$  ft. long: fls. very fragrant, 5-10 in an umbel, the scape compressed; tube 2-3 in. long; segms. linear, 1 $\frac{1}{2}$  in. long; staminal cup conspicuous, with short teeth, the free part of filaments only  $\frac{1}{4}$  in. long. Medit. region.

16. *HYMENOCALLIS*, Salisb. SPIDER-LILY. The American representatives of *Pancratium*, about 40 species, differing technically in having usually 2 ovules side by side in bottom of each cell (rarely 4-6): lvs. sometimes broad and narrowed into distinct petiole. (*Hymenocal-lis*: Greek *beautiful membrane*,

alluding to the staminal cup.)—Several kinds are grown for the pure white (rarely red-tinged) fragrant fls.: there is one Peruvian yellow-flid. species, apparently not in general cult. One species occurs in trop. Afr., but may have been introduced. Native species occur from the Carolinas south in low places and sandy soil. **H. rotata**, Herb., from N. C. to Fla., may be looked for in gardens: stoloniferous: lvs. linear: fls. 2–6, white with green tube 3–4 in. long which is equaled or exceeded by the linear often recurved lobes; staminal cup open, rotate, irregularly toothed, free part of filaments  $1\frac{1}{2}$  in. long; bulb with very long neck.

Filaments produced much beyond the staminal cup, straight..... 1. *H. americana*  
Filaments short (usually 1 in. or less) and incurved.

Length of free part of filaments about  $\frac{1}{2}$  in.: fls. sessile..... 2. *H. calathina*

Length of filaments 1 in.: fls. short-pedicelled..... 3. *H. macrostephana*

1. **H. americana**, Roem. (*H. littoralis*, Salisb. *Pancratium americanum*, Mill.). Lvs. several to many, sword-shaped,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. long, 1– $2\frac{1}{2}$  in. broad, bright green, tapering to apex, finely many-veined: fls. white, sessile, 3–8 on a flattened scape 1– $2\frac{1}{2}$  ft. high, the outer spathe-valves 2–3 in. long and very broad at base; tube variable in length, 4 in. or more; segms. linear, usually shorter than tube; staminal cup bell-shaped or broadly funnelform, about 1 in. long, dentate, the free filaments  $1\frac{1}{2}$ –2 in. long, anthers linear,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long; style equaling or exceeding stamens. Trop. Amer.; frequent in yards far S.

2. **H. calathina**, Nichols. (*Pancratium calathinum*, Ker. *Ismene calathina*, Herb.). Bulb with a long hyaline-sheathed neck: lvs. several, strap-shaped, thin,  $1\frac{1}{2}$ –2 ft. long and 1–2 in. broad, short-pointed or nearly obtuse: fls. white, large, sessile, 2–4 in the umbel, the outer spathe-valves lanceolate or ovate-lanceolate; tube  $2\frac{1}{2}$ –4 in. long, expanding at top; segms. lanceolate, nearly or quite as long as the tube; cup funnel-shaped, striped green, 2 in. long and rather broader, with spreading rounded fringed lobes, the free filaments  $\frac{1}{2}$  in. long. Andes, Peru, Bolivia.

3. **H. macrostephana**, Baker. Lvs. several, oblanceolate, 2–3 ft. long, 2–3 in. broad, bright green: fls. white, 6–10 on very short pedicels, the spathe-valves lanceolate; tube 3 in. long; segms. linear-lanceolate, somewhat exceeding tube; cup white, broadly funnelform and large (*macrostephana* means *large-crowned*), but rather narrower than in *H. calathina*, 2 in. long and broad, obscurely toothed, the free filaments which are 1 in. long incurved. Probably a hybrid, with *H. calathina* one of the parents.

17. **NARCISSUS**, L. Probably 25 or 30 original species, in Cent. Eu. and Medit. region to China and Japan, mostly European; handsome and hardy bulbous plants, familiar for spring bloom and for forcing; the autumn-flid. species are not popularly cult.—Lvs. linear and flat or narrow and rush-like, appearing with the fls., more or less equaling the unbranched scape, which is 2 ft. or less high (usually 10–18 in.): fls. yellow and white, mostly declined or nodding but sometimes upward-looking, 1 or several issuing from a 1-valved thin tubular spathe; perianth salverform, with a rather short cylindrical or funnelform tube, the segms. equal or very nearly so and ascending or reflexed; crown (corona) long and tubular like a corolla, medium length, or reduced to a shallow ring-like cup; stamens inserted in tube, the filaments mostly included in the crown, the anthers erect and basifixed; ovules many, one above another; stigma 3-lobed: caps. dehiscing loculicidally. (Narcis-sus: a classical Latin name, from the Greek; perhaps, as the etymology suggests, in allusion to narcotic qualities; probably not connected with the youth Narcissus in mythology.)—The hort. narcissi are much hybridized and modified, with many Latin names, and the fanciers' groups cannot be clearly followed or defined botanically.

A. The rush-leaved narcissi: lvs. very narrow, terete, or semi-terete and narrowly channeled on the face, sometimes almost subulate, green.

B. Crown small, much less than half as long as segms..... 1. *N. Jonquilla*

BB. Crown medium, about half as long as segms.  
c. Segms. oblong, obovate or ovate, spreading.

- d. Lvs. terete, very narrow..... 2. *N. juncifolius*  
 dd. Lvs. semi-terete, channeled..... 3. *N. odorus*  
 cc. Segms. lanceolate, reflexed straight backwards..... 4. *N. triandrus*  
 BBB. Crown equaling or exceeding segms..... 5. *N. Bulbocodium*  
 AA. The grass-leaved narcissi: lvs. flat or essentially so, not rush-like,  
 mostly glaucous.  
 B. Crown small, usually much less than half as long as segms.  
 c. Fl. usually 1 on a scape; crown crisped, red-edged..... 6. *N. poeticus*  
 cc. Fls. usually 2; crown crisped, not red-edged..... 7. *N. biflorus*  
 ccc. Fls. 4 or more; crown not crisped..... 8. *N. Tazetta*  
 BB. Crown about half as long as segms..... 9. *N. incomparabilis*  
 BBB. Crown equaling or exceeding segms..... 10. *N. Pseudo-Narcissu*

1. *N. Jonquilla*, L. JONQUIL. Slender and graceful: lvs. and scape 10-18 in. high, slender, subterete: fls. 2-6, horizontal or somewhat declined, some of the pedicels longer than the spathe, yellow throughout, fragrant; tube slender, nearly or quite 1 in. long; crown  $\frac{1}{2}$  in. or less long, crenate, much shorter than the obovate spreading segms. (Jonquilla: old name of the plant, connected with Latin Juncus, a rush.) S. Eu. and Algeria.—Common in old gardens.

2. *N. juncifolius*, Lag. Small and slender: lvs. and scape very slender, terete and rush-like, the lvs. usually 6 in. or less long and scape somewhat longer: fls. 1-4, horizontal or ascending, bright yellow or the crown perhaps darker; tube  $\frac{1}{2}$  in. long; crown cup-shaped and crenulate, about half the length of the ovate spreading segms. S. France, Spain, Portugal; little grown.

3. *N. odorus*, L. (*N. calathinus*, L. *N. Campernelli*, Hort.). CAMPERNELLE JONQUIL. Lvs. and scape subterete, channeled on the face, of about equal length: fls. 2-4 (sometimes 1), bright yellow throughout, fragrant, on pedicels little or not projecting from long-pointed spathe; tube not slender,  $\frac{3}{4}$  in. long; crown about  $\frac{1}{2}$  in. long and somewhat broader, crenate-lobed, about half the length of the obovate or oblong spreading segms. France and Spain eastward.—Sometimes grown as jonquil.

4. *N. triandrus*, L. Small: lvs. and scape very slender, subterete, channeled, 6-15 in. high: fls. 1-6, drooping or horizontal, pure white throughout, about 1 in. long; tube  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; crown cup-like, entire, half as long as the lanceolate reflexed segms. Spain and Portugal; little grown.

5. *N. Bulbocodium*, L. Small, early flowering: lvs. slender, subterete, channeled, usually exceeding the scape, 4-15 in. long: fl. 1, horizontal or ascending, usually standing 8 in. or less above the ground, bright yellow throughout; crown large and thin, megaphone-shaped,  $\frac{1}{2}$ -1 in. long, crenulate or entire, exceeding the very narrow segms., and about as long as the perianth-tube. S. France to Morocco; little grown.—Known in books as "Hoop-Petticoat Daffodil."

6. *N. poeticus*, L. Strong plant: lvs. flat, glaucous,  $\frac{1}{4}$ - $\frac{3}{8}$  in. broad, obtuse: fl. 1 (rarely 2), horizontal or ascending, clear white, very fragrant, the pedicels little or not at all projecting from spathe; tube about 1 in. long, rather thick; corona a very shallow cup with a crisped red edge, several times shorter than the broad obovate apiculate overlapping segms. France to Greece; common in cult.—Var. *radiiflorus*, Burb. (*N. radiiflorus*, Salisb.), has narrower-based segms. not overlapping; also narrower and more erect crown and narrower lvs. Var. *ornatus*, Hort., is early-flowering, with broad and rounded overlapping segms. There are double forms.

7. *N. biflorus*, Curt. PRIMROSE PEERLESS. Strong plant: lvs.  $\frac{1}{2}$  in. or so broad, faintly glaucous, about length of scape: fls. commonly 2 (sometimes 1 or 3), milky-white with pale yellow cup, the pedicels shorter than spathe; tube about 1 in. long, fairly thick; crown very short,  $\frac{1}{4}$  in. across, the crisped edge not red or different colored, several times shorter than obovate obtuse apiculate overlapping segms. France to Tyrol; little grown.

8. *N. Tazetta*, L. POLYANTHUS NARCISSUS. Strong species: lvs. long and flat, to 18 in.,  $\frac{3}{8}$ - $\frac{1}{2}$  in. broad, somewhat glaucous, obtuse, about the length of flattened scape: fls. few to several, usually 4-8, horizontal or declined, segms. white and crown light yellow, fragrant, rather small (1-1 $\frac{1}{2}$  in. across), pedicels projecting from the large spathe and sometimes very long; tube slender,  $\frac{3}{4}$ -1 in. long; crown cup-shaped and very short, much less than the obovate overlapping spreading or reflexed segms. (Tazetta: old S. European name, probably connected with Italian tarza, a cup.) Canary Is. to Japan.—A popular plant, widely variable. The Paper-White Narcissus, much used under glass for midwinter bloom, is a clear white-fl. sort. Var. *orientalis*, Hort. (*N. orientalis*, L.), is a robust form with long erect or curving pedicels (sometimes 4 in. long), segms. sulfur-yellow, crown prominent and one-third length of segms., dark yellow: often grown in water and some-



times known as "Chinese sacred lily." The Poetaz narcissi are hybrids of *N. poeticus* var. *ornatus* crossed by *N. Tazetta*, originating in Holland in 1885; now popular. They are like large-fl. *Tazetta*, with more open better-formed perianth and pleasanter fragrance.

9. *N. incomparabilis*, Mill. Strong species: lvs. narrow but flat,  $\frac{1}{4}$ – $\frac{3}{8}$  in. broad, glaucous, obtuse, nearly or quite equaling scape: fl. 1, horizontal or ascending, yellow, inodorous, the pedicel little if at all protruded from spathe; tube rather thick,  $\frac{3}{4}$  in. long; crown about  $\frac{1}{2}$  in. long and somewhat broader, plicate, about one-half length of the ovate or oblong mostly acute overlapping segms. Spain and S. France to Tyrol.—Popular and variable in cult. The segms. are sometimes white; usually the yellows of segms. and crown are different. There are double forms. *N. Barrii*, Hort., represents a series of medium-crowned kinds, intermediate between *N. incomparabilis* and *N. poeticus*: fl. 1, horizontal or ascending, yellow; crown crenulate, about one-third length of oblong spreading segms. *N. Leedsii*, Hort., in several forms, is intermediate between *N. Pseudo-Narcissus* and *N. poeticus*: fl. 1, horizontal or declined; crown yellow, crenate, nearly or quite half as long as oblong spreading whitish segms.

10. *N. Pseudo-Narcissus*, L. DAFFODIL. TRUMPET NARCISSUS. Strong stout plant: lvs. flat,  $\frac{1}{4}$ – $\frac{3}{4}$  in. broad, glaucous, obtuse or only short-acute, 10–15 in. and about as long as scape: fl. 1, horizontal or ascending, not stalked beyond the spathe. 2–2½ in. long, the segms. and crown usually different shades of yellow; tube broad, about  $\frac{1}{2}$  in. long; crown  $1\frac{1}{2}$ –2 in. long with erect more or less frilled edge, about as long as oblong or ovate segms. Sweden to England, Spain and Roumania.—The prevailing narcissus in cult. for forcing and the open. It runs into many forms, some of them double. The color sorts run to white-fl. kinds and to the Bicolors, with corona and segms. of markedly different shades; in the wild, the corona is lemon-yellow, and the segms. pale sulfur-yellow. To this group belong the Ajax narcissi. There are forms with cernuous fls., with twisted segms., of large and small stature.

18. *ALSTRÆMERIA*, L. About 50 species, in S. Amer., grown in pots and also in the open for summer bloom.—Sts. mostly slender, leafy, often weak and even inclined to climb, from a root of thickened fibers not bulbous or rhizomatous: lvs. narrow, often twisted at base, more numerous on the sterile shoots: fls. showy, more or less lily-like, usually not over 2 in. long, red, yellow or purple and frequently spotted, in a terminal simple or compound umbel; perianth without tube, the limb somewhat irregular, the 2 series of segms. being dissimilar and the lower segm. of the inner row mostly different from the other two; stamens inserted on base of segms., declined, often unequal, anthers relatively small and basifixed; ovules many in each cell, one above the other; style slender and stigma 3-parted: caps. loculicidal, 3-valved. (*Alstrœmeria*: Claus Alstrœmer, friend of Linnæus, who wrote somewhat on botany.)

*A. aurantiaca*, D. Don (*A. aurea*, Meyen, and Hort.). Erect and slender, 2–3 ft. high: lvs. many, lanceolate, 3–4 in. long including the narrow petiole-like base, several-nerved, scattered on st. but whorled under umbel: fls. few to many, in an umbel with branching rays or pedicels, bright yellow with long brown spots on inner segms., about  $1\frac{1}{2}$  in. long above the ovary; outer segms. spatulate, inner ones narrower. Chile; hardy in northern states.

19. *AGAVE*, L. Three hundred or more species of striking plants, in the arid and semi-arid trop. parts of the western hemisphere, with great stiff heavy persistent lvs. mostly in basal rosettes and towering panicles or spikes of relatively small fls.; planted for formal and architectural effects.—St. short or none: plants of differing habit, some blooming from year to year, others at intervals, and still others once, at which time they die: lvs. fleshy, mostly with spiny edges, and spine-tipped: perianth more or less funnelform, with short tube, the 6 segms. narrow and nearly equal; stamens inserted at throat or in the tube, the filiform filaments usually long-exserted, the anthers versatile; ovules many and superposed in each cell; style awl-shaped; stigma capitate but 3-lobed: caps. oblong, loculicidally 3-valved; seeds numerous, thin and flat, black. (*Aga-ve*: from the Greek word for *admirable*.)—Many species of

Agave are grown in collections of succulents, and a number are planted in warm dry regions for lawn and foundation effects. They bloom only seldom and are therefore difficult of determination except by specialists. Only one species is a common and general plant in cult. In Mex., where agaves are many, several species have great economic importance, yielding the liquors *pulque* and *mescal*, the fiber *sisal*, or *henequen*, and other products.

The genus *Furcraea* yields a few cult. species, much like Agave, but the fls. white and rotate rather than funnelform and greenish-yellow, the stamens swollen at base rather than filiform. The species are trop. American.

**A. americana**, L. CENTURY PLANT, so called from the erroneous notion that it blooms only when 100 years old: lvs. borne next the ground in a massive rosette, 3-6 ft. long and 6-8 in. broad, thick and heavy, gray, smooth, upcurved, prickly on the edges: fls. in a bracted scape or stalk 20-40 ft. tall, about  $2\frac{1}{2}$  in. across with segms. yellowish-green, borne erect on many horizontal branches; the infl. is produced at the maturity of the plant, at 10 years or more, whereupon the plant dies but usually leaves suckers about the base. Trop. Amer., and established also in parts of Eu.; much grown as a tub-plant for placing on porches and lawns in summer, particularly in the kinds with yellow- or white-margined or striped lvs.

**20. POLIANTHES**, L. About a dozen Mexican herbs, one of which is in common cult. for its fragrant fls. in summer.—Rootstock a tuber: lvs. grass-like, basal and cauline, those on the st. reduced or bract-like: fls. white, somewhat lily-shaped, in a long raceme or spike terminating the erect st.; tube slender; segms. short and nearly or quite equal; stamens inserted in tube, included; ovules many in each cell, one above the other; style slender; stigmas 3: caps. bearing the persistent perianth on top, the seeds flat. (Polian-thes: probably from Greek words meaning *white* or *shining flowers*.)

**P. tuberosa**, L. TUBEROSE. Tuber bulb-shaped (whence the name *tuber-ose*) but the plant commonly classed among the "bulbs": st.  $2\frac{3}{4}$  ft. tall, strict and simple, bearing successively smaller long-pointed clasping lvs.: fls.  $2\frac{1}{2}$  in. or less long, in pairs in an open spike, waxy-white and very fragrant; tube  $1-1\frac{1}{2}$  in. long, bent near base, expanding widely where it meets the oblong obtuse segms.: some forms are double. Unrecognized wild.

**21. CURCULIGO**, Gaertn. A dozen species in tropics of both hemispheres, one or two of which are grown as foliage plants in greenhouses and conservatories.—Stemless, with short more or less tuberous rhizome: lvs. from the crown, long, plicate, firm, sometimes split or divided longitudinally into 2 lobes: fls. small and inconspicuous, in dense heads or spikes near the ground and mostly concealed by the foliage; perianth with 6 nearly or quite equal spreading segms. on a long beak-like projection of the ovary; stamens inserted on base of segms., filaments short, anthers attached at or near the base; ovules 2 to many in each cell; style short and columnar, bearing 3 stigmas: fr. more or less fleshy, indehiscent. (Curcu-ligo: Latin *curculio*, a weevil, from the beaked ovary.)

**C. capitulata**, Kuntze (*C. recurvata*, Dry.) Lvs. 1-3 ft. long and 2-6 in. broad, entire, plaited, the blade recurving, petiole long and channeled: scapes mostly shorter than petioles, often scarcely rising above the crown, brown-hairy, recurved or bent downward at the end: fls. yellow, about  $\frac{3}{4}$  in. across. Trop. Asia, Australia. —**C. latifolia**, Dry., has a very short-stalked erect rather than recurved infl.: lvs. 1-2 ft. long, 1-5 in. broad, curving, graceful and decorative. Asia.

## 27. DIOSCOREACEÆ. YAM FAMILY

Ten genera and more than 200 species, most of them in the genus *Dioscorea*, widely spread in temp. and trop. regions around the world, constitute this family; several of the species are cult. for their large edible subterranean and aerial tubers, yielding important staple food materials in warm countries; a

few are grown for ornament.—Vines, prevailingly herbaceous, most of them twining, a few merely procumbent: lvs. alternate or opposite, broad and petiolate, entire or digitate, with a middle vein and strong side veins from the base of the blade, netted-veined, the lvs. therefore among the exceptions in the monocotyledons: fls. small, in spikes or racemes, declinous, the plants monœcious or diœcious, but in one tribe bisexual; perianth regular, of 6 parts in 2 series but not clearly differentiated into calyx and corolla, in fertile fls. adherent to the ovary; stamens 6 or sometimes 3; ovary 3-celled or with 3 placentæ, 1 or 2 of the compartments sometimes abortive; styles 3, distinct: fr. a 3-winged or strongly 3-angled caps. or flattened when only 1 cell develops, or sometimes baccate.—Aside from Dioscorea, the genus *Rajania*, with a half-dozen species in the W. Indies, yields species with large tubers; *R. pleioneura*, Griseb., is probably best known; it bears large cockscombed aerial tubers and cordate-ovate 9-nerved cuspidate lvs.: fr. with broad wing. The genus differs in having a flat fr., only 1 carpel developing. (*D.* Fig. 7, page 126.)

**DIOSCOREA**, L. **YAM**. Distributed in both eastern and western hemispheres, numerous in the tropics and subtropics; in the N. U. S. one species (*D. villosa*, L.) is native, and this has several segregates.—Fr. a 3-celled caps. with 2 winged seeds in each cell: fls. declinous. (Dioscorea: dedicated to Dioscorides, Greek physician and naturalist, A. D., 1st or 2nd century.)—Aside from the following species grown for the edible tubers, certain others have been cult. under glass for ornamental foliage, but it is doubtful whether they are known in this country; other species of yams are also grown in the tropics for food. The word yam is also applied to the sweet potato. *D. sativa*, L., is not clearly defined by Linnaeus, and it is differently interpreted by different authors. It is considered to be a southeastern Asian species, spontaneous in the W. Indies.

- Sts. terete or somewhat angled, wingless: lvs. entire.  
 Lvs. mostly opposite, cordate at base not angled or lobed; no aerial tubers.....1. *D. cayennensis*  
 Lvs. opposite, mostly strongly angle-lobed at base, sagittate or halberd-shaped; bearing small seed-like aerial tubers.....2. *D. Batatas*  
 Lvs. alternate, entire: st. producing large aerial tubers.....3. *D. bulbifera*  
 Sts. sharply angled or narrowly winged: lvs. deeply lobed.....4. *D. trifida*  
 Sts. strongly winged: lvs. entire.....5. *D. alata*

1. ***D. cayennensis***, L. **YELLOW or ATTOTO YAM**. St. terete or angular, glabrous, usually prickly toward base, without tubers in axils: lvs. usually opposite, ovate to oblong-ovate, deeply cordate at base, abruptly short-pointed, entire, 7-9-nerved: racemes 2 or more in the axil, simple, the anthers 6. W. Indies to Brazil.

2. ***D. Batatas***, Decne. **CHINESE YAM**; when grown for ornament in the N. (the root being hardy) the plant is known as **CINNAMON-VINE**. Tubers long and deep in the ground (sometimes 2-3 ft. long), therefore difficult to dig: st. more or less angled, sometimes twisted, glabrous, bearing small rounded bulblet-like tubers in the axils: lvs. opposite, ovate or deltoid in outline, cuspidate at apex, usually strongly broadened and angled at base: fls. sessile in 1 or 2 simple raceme-like spikes from the axils, cinnamon-scented. (*Batatas: potato*; see *Ipomœa Batatas*.) China.

3. ***D. bulbifera***, L. **AIR POTATO**. Root tubers small or none: tall strong glabrous vine, sts. terete, bearing in the axils large angular tubers often 1 ft. long and weighing several pounds: lvs. alternate, cordate-ovate, cuspidate, 7-9-nerved, petiole longer than blade, margin entire: fls. in numerous slender paniced drooping axillary spikes 3-4 in. long. Trop. Asia, Malaya, and Philippines.—Grown sometimes for the aerial tubers.

4. ***D. trifida***, L. f. **CUSH-CUSH. YAMPEE**. Tubers rather small, but of superior quality: st. glabrous, sharply angled or narrowly winged, often twisted, not tuber-bearing: lvs. large, very broad in outline, truncate or nearly so at base, 3-5-lobed to the middle or lower, strongly 7-9-nerved, the middle lobe 3-nerved, the lateral lobes sometimes partially lobed at base: staminate fls. in slender and simple racemes, the pistillate in spikes. S. Amer.; cult and spontaneous in W. Indies.

5. *D. alata*, L. Root tubers very large, reaching 6–8 ft. in length: sts. climbing, 4-winged or sharply 4-angled, often with small axillary bulb-like tubers: lvs. opposite, cordate-ovate to cordate-oblong, with deep basal sinus, sharply acuminate, 7–9-nerved: staminate fls. in narrow axillary panicles 8–12 in. long, green; pistillate fls. in simple spikes: caps. leathery, elliptic, 3-winged. India to Malaya; cult. for the subterranean tubers, and run wild.

## 28. IRIDACEÆ. IRIS FAMILY

About 60 genera and 1,000 species comprise the Iris family, which is represented in temp. and trop. regions around the world; many of the choicest hort. plants are included, as irises, gladioli, freesias, and crocuses; all are perennial, usually with rhizomes, corms, or bulbs.—Herbs, at least the cult. species, mostly low plants with simple or branching sts. (in *Crocus* the st. not rising above the ground), and mostly basal and equitant parallel-veined linear or sword-shaped lvs.: fls. usually showy, bisexual, issuing from a spathe of 2 or more mostly scarious bracts; perianth of 6 parts in 2 series, the outer 3 often calyx-like, all generally connate into a tube that is adnate to the ovary; stamens 3, with extrorse anthers; pistil 1, with inferior mostly 3-celled ovary, single style and 3 stigmas which are sometimes expanded and petal-like: fr. a loculicidal few- to many-seeded caps. Fig. 8, page 151.

- A. Plant with evident scape or st. above ground.
  - B. Fls. usually more than 1 from each spathe (or pair of bracts) on the main rachis of the infl. (although each fl. also has a spathe); blossoms short-lived, one following another.
    - C. Style-branches expanded and petal-like with 2 terminal lobes or crests beneath which is the stigma.
      - D. Perianth tubular above ovary; filaments free. . . . . 1. IRIS
      - DD. Perianth without tube; filaments united. . . . . 2. MORÆA
    - CC. Style-branches not petal-like.
      - D. Branches opposite the stamens, bifid. . . . . 3. TIGRIDIA
      - DD. Branches alternate with stamens, flattened and emarginate. . . . . 4. BELAMCANDA
  - BB. Fls. only 1 from a rachal spathe, not fugitive.
    - C. Style-branches simple (not divided).
      - D. Stamens around the pistil, not at one side of perianth. . . . . 5. IXIA
      - DD. Stamens at one side of perianth, declinate or arching.
        - E. Lvs. plicate and hairy. . . . . 6. BABIANA
        - EE. Lvs. not plicate and hairy.
          - F. Limb of perianth regular or essentially so.
            - G. Spathe-valves large, green, long-pointed. . . . . 7. ACIDANTHERA
            - GG. Spathe-valves small, not herbaceous.
              - H. Valves deeply cut or torn. . . . . 8. SPARAXIS
              - HH. Valves (or the outer one) emarginate. . . . . 9. TRITONIA
              - HHH. Valves entire. . . . . 10. CROCOSMIA
            - FF. Limb of perianth very irregular.
              - G. Perianth-tube abruptly dilated at middle; fl. long and slender. . . . . 11. ANTHOLYZA
              - GG. Perianth-tube gradually widening; fl. broad. . . . . 12. GLADIOLUS
      - CC. Style-branches 2-lobed or -parted.
        - D. Tube much enlarging above base.
          - E. Blossoms on an erect rachis. . . . . 13. WATSONIA
          - EE. Blossoms on a sideways rachis. . . . . 14. FREESIA
          - DD. Tube slender throughout. . . . . 15. LAPEIROUSIA
    - AA. Plant with no st. or scape above ground. . . . . 16. CROCUS

1. *IRIS*, L. *IRIS*. FLEUR-DE-LIS. Probably upward of 150 species, in the north temp. zone; several species are well known garden plants and many others are prized by fanciers; mostly spring and early summer bloomers; perennials.—Plants with rhizomes or bulbs: st. erect, simple or branched, bearing 1 to several fls. at its top, the fls. mostly of short duration, one following another: lvs. mostly radical and basal but usually a few on the st., linear to sword-shaped, flat, equitant, many-nerved lengthwise: fls. showy, in many colors, borne in “heads,” a term used to denote the issue from each spathe or pair of bracts, one fl. following another, but sometimes only 1 fl. is borne; each of the bracts is known as a spathe-valve (*H5* in Fig. 8); segms. of fl. generally united into a long or short tube; 3 outer segms. hanging or reflexed, known as



"falls," (*H*, Fig. 8), in many species bearded on part of upper surface (*H4*), narrowed toward the base to a "haft"; 3 inner usually erect and often arched (*H1*), known as "standards" and narrowed to a "claw" (in fanciers' descriptions the standards are described, according to their position, as flat, arching, domed or over-arched, conic, cupped, floppy, tips appressed); 3 style-branches expanded, colored and petal-like, outwardly spreading and covering the 3 stamens, bifid or crested at the tip beyond the stigmatic part beneath (*Hh* in Fig. 8); ovary sessile or pedicelled within the spathe: caps. oblong, 3- or 6-angled, many-seeded. (*I*-ris: Greek the *rainbow*.)—Numbers of irises are grown by fanciers and specialists, many of them being cultural forms and hybrids. The commonest species and the main groups are included in this treatment. The lilac and purple irises of yards are known as "blue flags."

**Division I.** Plant with a thick more or less branching rootstock.

- A. Falls (outer segms.) bearing a fimbriate petal-like crest: *EVANSIA* (Thos. Evans who had introduced many plants into England early in the 19th century)..... 1. *I. japonica* (*I. tectorum*)
- AA. Falls bearing a beard or close continuous line or band of hairs down the lower half of blade and claw: *POGONIRIS* (i.e. "bearded iris.")
  - B. Plant dwarf, the st. very short or practically wanting..... 2. *I. pumila* (*I. Chamæiris*)
  - BB. Plant tall, with prominent sts.
    - c. St. about equaling lvs.: first spathe-valves green..... 3. *I. variegata*
    - cc. St. much exceeding lvs.
      - d. Spathe-valves green, or not wholly scarious, at flowering-time.
        - E. Fls. yellow..... 4. *I. flavescescens*
        - EE. Fls. purple, lilac, white.
          - F. Lateral heads or fl.-clusters stalked..... 5. *I. germanica*
          - FF. Lateral heads sessile or nearly so..... 6. *I. florentina*
          - DD. Spathe-valves wholly scarious (thin and dry)..... 7. *I. pallida*
    - AAA. Falls loosely hairy on lower part of blade and claw: *ONCOCYCLUS* (Greek, "bearded circle," referring to position of hairs on segms. of some species)..... 8. *I. susiana*
    - AAAA. Falls without crest or beard or loose hairs (sometimes pubescent): *APOGON* ("beardless").
      - B. Lvs. linear,  $\frac{1}{2}$  in. or less broad, usually very narrow and grass-like.
        - c. Sheaths of lvs. not splitting into fibers: st. practically none .. 9. *I. unguicularis*
        - cc. Sheaths splitting into fibers: st. long.
          - d. Spathe-valves scarious..... 10. *I. sibirica*
          - DD. Spathe-valves green..... 11. *I. ensata*
      - BB. Lvs. broad-linear to sword-shaped, usually more than  $\frac{1}{2}$  in. broad.
        - c. St. bearing several long lvs.: fls. yellow..... 12. *I. pseudacorus*
        - cc. St. bearing 2-4 much-reduced lvs.
          - d. Haft about as long as blade.
            - E. Standards 1 in. broad: fls. yellow often margined white..... 13. *I. orientalis* (*I. Monnieri*)
            - EE. Standards less than  $\frac{1}{2}$  in. broad: fls. bright yellow .. 14. *I. aurea*
            - DD. Haft longer than blade: fls. lilac (pale yellow)..... 15. *I. spuria* (*I. halophila*)
            - DDD. Haft shorter than blade: fls. lilac varying to white..... 16. *I. laevigata*

**Division II.** Plant with a bulbous base.

- A. Standards (inner segms.) large and erect: *XIPHIDIUM* (i.e. "sword," referring to lvs.)
  - B. St. short or practically wanting..... 17. *I. reticulata*
  - BB. St. 1 ft. or more tall.
    - c. Falls with fiddle-shaped claw..... 18. *I. Xiphidium*
    - cc. Falls with wedge-shaped claw..... 19. *I. xiphoides*
- AA. Standards small or minute, spreading or deflexed: *JUNO* (the goddess).
  - B. St. short or practically wanting..... 20. *I. persica*
  - BB. St. evident, leafy..... 21. *I. orchinoides*

1. *I. japonica*, Thunb. Stoloniferous, forming patches: st. 1-1½ ft. high, with many fls. in a long loose raceme, the outer spathe-valve green and about equaling the pedicel: lvs. about as long as st.,  $\frac{1}{2}$ -1 in. broad: fls. thin and delicate, 2 in. across, short-lived, lilac or bluish; falls obovate, with crisped edges and yellow lower part and haft, bearing a central fimbriated crest; standards nearly equal in length to falls, spreading. Japan, N. China.—Adapted to warmer parts of country. *I. tectorum*, Maxim., another Evansia iris, is sometimes planted: pedicel much shorter than spathe: fls. bright lilac; falls with orbicular blade, wavy margin, and large lacinate white and lilac crest. Japan and China.

2. *I. pumila*, L. (*I. cærulea*, Spach). Plant making a dense rapidly spreading clump: st. very short or none, bearing 1 fl.: lvs. linear to broad-linear, about  $\frac{1}{4}$  in. broad, 2-5 in. long: fls. not fragrant, with very slender green tube about 2 in. long, the segms. somewhat shorter and yellow or lilac; falls  $\frac{3}{4}$  in. broad, recurved, densely bearded, standards of similar length. Cent. Eu. to Asia Minor.—It runs into several color forms. *I. Chamæiris*, Bertol., has a short-tubed fl. (tube 1 in.) with bright yellow segms., beard dense and yellow, half tinged brown: st. 1-10 in. high, bare above. S. France eastward; often planted.

3. *I. variegata*, L. St. 1-1½ ft. tall, with 3 or 4 heads of fls., about equaling the sword-shaped slightly glaucous lvs. which are 1 in. broad: fls. yellow-brown, the yellow-green tube cylindrical, 1 in. or less long; falls oblong, less than 1 in. broad, veined brown on a yellow ground, brown toward the tip and yellow on haft, beard yellow; standards oblong, erect, bright yellow, claw veined brown. S. E. Eu.

4. *I. flavescens*, DC. St. 2-3 ft., bearing 3 or 4 heads, the spathes 2-3-fld.: lvs. 12-15 in. long and 1 in. broad, sword-shaped, glaucous: fls. yellow, not fragrant, tube cylindrical and less than 1 in. long; falls 1 in. and more broad, obovate, reflexed, beard deeper yellow than limb; standards somewhat broader, pale yellow. S. E. Eu., Asia Minor.

5. *I. germanica*, L. GERMAN IRIS. This species yields many garden forms, varying in stature and color, some of them the result of hybridization; one of the sources of orris-root: plant with stout rhizome: st. 2-3 ft., bearing 2-fld. terminal head and 2 usually 1-fld. stalked branches: spathe-valves oblong-lanceolate, tinged purple, green on lower part at flowering time: lvs. 1-1½ ft., sword-shaped, 1-1½ in. broad, shorter than st.: fls. lilac and lilac-purple (varying to white), not fragrant, the cylindrical tube greenish and about 1 in. long; falls obovate, dark violet-purple, 1-1½ in. broad, reflexed, the beard yellow; standards obovate, size of falls, usually lighter colored. Cent. and S. Eu.—Not all the plants known as German iris are *I. germanica*: some of them are *I. florentina* and *I. pallida*. Others may be *I. squalens*, L.: very like *I. germanica*, but carrying yellow and brown in the fl.; falls bright lilac-purple, the haft veined on a whitish or yellow ground color, the beard yellow; standards dull lilac with smoky yellow and brownish. Cent. Eu. to Persia. *I. neglecta*, Horn., known only in cult.: standards lighter colored than fls., the latter tube to bright lilac, the haft striped lilac on white ground. Still other species are probably involved in the parentage of cult. forms.

6. *I. florentina*, L. Very like *I. germanica*, but heads sessile or nearly so, spathe-valves nearly or partly scarious, and fls. white, the falls tinged lavender, with yellow beard; runs to pure white forms and to those with blue tints. Cent. and S. Eu.—*I. florentina* is a name of doubtful application, but its historical use is to be recognized.

7. *I. pallida*, Lam. Differs from *I. germanica* in shorter spathe-valves which are wholly scarious, fl.-heads of greater number, fls. later and fragrant: fls. violet (varying to white), beard yellow. S. Eu. to W. Asia.

8. *I. susiana*, L. MOURNING IRIS. An odd species, sometimes grown in pots or under special culture: rhizome short: st. 6-12 in. high, with 2 or 3 lvs., 1-headed, spathes green, 3-4 in. long and bearing 1 or 2 fls.: radical lvs. linear,  $\frac{1}{2}$  in. or less broad, 6-12 in. long: fls. brown-purple or nearly black, the cylindrical tube 1-1½ in. long; falls large and drooping, obovate, with broad brown beards and veins and spots of black-brown on a very dark purplish ground; standards broader than falls, brownish-white spotted brown and black. (Susiana: Susa, an ancient city of Persia.) S. W. Asia.

9. *I. unguicularis*, Poir. Blooming very early: rhizome stout: st. very short or practically none, the fls. borne among the foliage, spathes 1-3-fld., the outer valve long and green: lvs. 1-2 ft.,  $\frac{1}{3}$  in. or less broad, linear: fls. bright lilac (to white), fragrant, with very long tube (5-6 in.) and long narrow ovary; falls obovate, 1 in. broad, keeled yellow, at throat streaked lilac on lighter ground; standards long-unguiculate,  $\frac{3}{4}$  in. broad. Algeria.

10. *I. sibirica*, L. Wide-spread and variable species, with short rhizome, compact, growing in tufts: st. 1-2½ ft., surpassing the foliage, terete and hollow, simple or forked, bearing 1 terminal and 1 lateral head, spathes 2- or 5-fld., valves brown-scarious, 1-1½ in. long: lvs.  $\frac{1}{3}$  in. or less broad, linear, the sheaths splitting into slender fibers: fls. lilac, not large, tube none or very short; falls with orbicular blade  $\frac{3}{4}$ -1 in. across; standards erect,  $\frac{1}{2}$  in. or less across. Eu., Asia.

11. *I. ensata*, Thunb. Rhizome stout, making tough clump: st. 6-16 in. high, 1-headed, the spathes 3-4 in. long and leafy, 1-3-fld.: lvs. linear, about equaling the sts.,  $\frac{1}{2}$  in. or less broad, somewhat glaucous, strongly nerved, the basal sheaths splitting into slender fibers: fls. lilac, not showy, the tube practically wanting but

ovary long and narrow; falls narrow,  $\frac{3}{4}$  in. or less broad, veined dark blue and yellowish toward base; standards erect, about  $\frac{1}{4}$  in. broad. Caucasus to Japan.—Var. *pabularia*, Naud. (*I. pabularia*, Naud.), KRISHUM, is a large robust plant introduced into N. Amer. for forage, but little known; said to endure the dry weather of Cent. Asia: 2-3 ft., producing many lvs.

12. *I. Pseudacorus*, L. Robust species, forming large strong clumps: st. 2-3 ft., branched, leafy below, terete, bearing several clusters of fls., spathes 2- or 3-fld., the valves large and lf.-like and exceeding pedicels: fls. bright yellow, the tube about  $\frac{1}{2}$  in. long; falls with orbicular blade  $1\frac{1}{2}$  in. or less broad, haft with a bright spot; standards narrow,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, erect. (*Pseudacorus*: false *acorus*, known as *Acorus* in pre-Linnæan days.) Eu., N. Afr., Syria, in several forms; also naturalized in N. Amer.—There is a var. with striped lvs.

13. *I. orientalis*, Mill. A very large iris, growing in strong clumps, with stout rhizome: st. 3 ft., stout, terete, about as long as the lvs. or a little surpassing them, bearing 2-4 reduced lvs. and 2 or 3 heads, spathes 2- or 3-fld., the valves large, green, 1 in. long; radical lvs. sword-shaped, 2-3 ft. long, 1 in. broad: fls. bright yellow, with prominent tube; falls obovate, 1 in. broad, haft as long as blade, paler or white toward margin; standards shorter than falls and about as broad. Asia Minor, Syria.—I. *Monnieri*, DC., of Rhodes and Crete, has lvs. 1- $1\frac{1}{2}$  in. broad: fls. lemon-yellow; fall orbicular, 1- $1\frac{1}{2}$  in. broad, not veined. *I. orientalis* itself is variously defined.

14. *I. aurea*, Lindl. Tall species, with st.  $2\frac{1}{2}$ – $3\frac{1}{2}$  ft., stout and terete, bearing several reduced lvs., 1 terminal head and about 2 sessile lateral heads, spathes 2- or 3-fld., pedicels long, spathe-valves 3-4 in. long and green: lvs. sword-shaped, little if at all glaucous, 1 in. or so broad, to 2 ft. long: fls. bright yellow, with slender tube; falls with oblong blade 1 in. broad and as long as haft; standards shorter and much narrower. W. Himalayas.

15. *I. spuria*, L. St. stout, 1-2 ft., sparingly branched, with 1-3 heads, spathes 2- or 3-fld., valves narrow and green and longer than pedicels: lvs. shorter than st., broad-linear, about  $\frac{1}{2}$  in. broad, 1 ft. long, somewhat glaucous: fls. lilac, the tube  $\frac{3}{4}$  in. or less long; falls with orbicular blade  $\frac{1}{2}$  in. broad and half as long as haft; standards somewhat shorter and  $\frac{1}{2}$  in. or less broad. Eu. and Algeria to Persia, in many forms.—I. *halophila*, Pall. (*I. Gueldenstædtiana*, Lepech.) of S. E. Eu. and Asia, has pale yellow fls.; falls with orbicular blade  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad and much shorter than very narrow petiole-like haft which is lilac-veined and yellow on keel.

16. *I. lævigata*, Fisch. JAPANESE IRIS. Showy iris, much cult. in many forms, blooming just after the other beardless kinds: st.  $1\frac{1}{2}$ –2 ft., glaucous, with 2 or 3 reduced lvs., and usually a single head, spathes 2- or 3-fld., valves narrow and green, pedicels 2 in. or less long: lvs. shorter than st., narrow-ensiform to nearly linear,  $\frac{3}{4}$  in. or less broad: fls. bluish and violet (varying to white), tube broad,  $\frac{1}{2}$  in. long; falls nearly horizontal or loosely lopping so that the fl. has a flat open appearance and 4-6 in. across; standards ovate, short and small, erect. E. Siberia and Japan.—The name *lævigata* is here used (in lieu of a truer name) broadly to designate the cultivated Japanese irises, although the true wild *I. lævigata* may be only partially represented in them. I. *Kämpferi*, Sieb. (*I. lævigata* var. *Kämpferi*, Maxim.), may be more strongly involved in them. *I. lævigata* itself is a blue-fld. species with pods about 2 in. long, and lvs. without a central prominent ridge; *I. Kämpferi* is natively reddish-purple with pods about half as long, and lvs. with a strong central ridge. Many of the cultivars may represent mutations and other departures, or hybrids in which possibly other species are also involved.

17. *I. reticulata*, Bieb. Early-flowering iris, sometimes grown in pots, in several color-forms: bulb 1 in. diam.: st. very short, spathe 1-fld., valves inclosing the tube of fl.: lvs. short at flowering-time but becoming 1 ft. and more long, 4-angled and with horny edges, narrow, usually 2 together: fls. typically violet-purple, fragrant, tube slender and 2-3 in. long; falls with ovate blade  $\frac{1}{2}$  in. broad and shorter than haft, pale at throat and bearing yellow crest; standards only  $\frac{1}{4}$  in. broad. S. W. Asia.

18. *I. Xiphium*, L. SPANISH IRIS. One of the oldest cult. irises: bulb 1 in. or so diam.: st. 1-2 ft., 1-headed, spathe 1- or 2-fld., outer valves green, pedicels long: lvs. 1 ft. long or shorter above, linear and deeply furrowed, glaucous: fls. violet-purple, tube none; falls with orbicular blade 1 in. broad and much shorter than fiddle-form haft; standards oblong, as long as falls,  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad. (*Xiphium*: from Greek for sword, ancient name of a plant with sword-shaped lvs.) Spain and adjacent regions, N. Afr.—There are color-strains.

19. *I. xiphioides*, Ehrh. ENGLISH IRIS. Later-blooming than No. 18: bulb larger: st.  $1\frac{1}{2}$ –2 ft., 1-headed, pedicels much shorter than ventricose spathe: fls.

dark violet-purple; falls somewhat larger, usually yellow in center, narrowed to a longer cuneate haft; standards oblong or obovate, shorter than falls,  $\frac{1}{2}$ –1 in. broad. Pyrenees.—Several color-vars.

20. **I. persica**, L. PERSIAN IRIS. Grown in pots and also lifted and carried over winter: bulb 1 in. or less diam.: st. none or very short; head 1 and 1-fl., valves green and 2 in. long: lvs. few in a basal tuft, linear, recurved, only 2 or 3 in. long at flowering-time but becoming longer: fls. pale lilac, tube 2–3 in. long; falls with orbicular emarginate blade  $\frac{1}{2}$  in. broad, purple-blotched at top, orange-keeled, purple-lined and spotted; haft auricled at top; standards small and spreading. Asia Minor, Persia.—Long cult., with several color variations.

21. **I. orchoides**, Carr. ORCHID IRIS. Sometimes grown in pots: bulb 1–1 $\frac{1}{2}$  in. diam.: st. jointed, 12–15 in., leafy, 3–6-headed, spathes 2 in. long, 1-fl., valves green: lvs. few, lanceolate, 6–9 in. long at flowering-time: fls. yellow with purple blotch on either side crest on the haft, the blade of falls  $\frac{1}{2}$  in. broad and obovate; standards less than 1 in. long, oblanceolate and pointed, erect or deflexed. Turkestan.—Two or three color vars.

2. **MORÆA**, Mill. Much like *Iris*, being the representative of that genus in the southern hemisphere: differs in the species mostly cormous, perianth not possessed of a tube above the ovary, filaments more or less united: outer segms. cuneate, with reflexing limb; inner segms. either similar and smaller or in some kinds reduced to small tricuspidate parts. (Moræa: J. Moræus, Swedish physician, father-in-law of Linnæus.)

**M. iridioides**, L. St. 1–2 ft. or more from a short creeping rhizome: lvs. distichous, in basal rosettes, about as long as st.: fls. 3–4 to a spathe, white with yellow on claws of outer segms., the lanceolate style-crests marked blue, a continuous bloomer in congenial climates; perianth about 1 $\frac{1}{2}$  in. long. S. Afr.

3. **TIGRIDIA**, Juss. TIGER-FLOWER. About a dozen bulbous or cormous plants, Mex. to Chile, one of which is sometimes planted: fls. wide open, fugitive, without tube, yellow, orange or purplish, oddly spotted.—Sts. terete, simple or forked, 2 $\frac{1}{2}$  ft. or less tall, with a few narrow-plicate lvs., and bearing 1 or more fls. from each of the 1- or 2-valved lf.-like spathes: fls. erect; segms. 6 in 2 rows, the rows usually much unlike, with the inner ones smaller, connivent into a broad cup from which the blades stand nearly or quite horizontally; stamens 3, the filaments united into a long slender tube that includes the style and projects from the fl.; ovary 3-celled, style long and 3-parted at end, each part again parted: caps. loculicidal. (Tigrid-ia: Latin *tigris*, tiger; applied here to markings of the fl.)

**T. Pavonia**, Ker. Corm or bulb 1 $\frac{1}{2}$  in. diam.: erect, branched or unbranched, 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  ft., bearing several rather rigid lvs., the spathe-valves 3–5 in. long: fls. red and spotted, produced in succession, 3–6 in. across, very showy, with cup-like center, the staminal column prominent; outer segms. spreading, obovate and obtuse, the claw purple or yellow; inner segms. half the length of outer, blade ovate-acute. Mex., Guatemala.—Very variable in color under cult., and several named vars. are known; it runs to lilac, yellow, and pure white.

4. **BELAMCANDA**, Adans. (*Gemmingia*, Fabr. *Pardanthus*, Ker). One species in China and Japan, frequently planted and somewhat naturalized in N. Amer.—Strong-growing branching perennial with rhizome, distichous iris-like lvs., and orange red-spotted fls. in a dichotomous infl.: fls. on pedicels exceeding the spathes; segms. 6, united at base into very short tube above the large ovary, twisting as they fade, the 3 inner ones somewhat shorter; stamens 3, attached at base of segms., anthers basifixed; ovary 3-celled, club-shaped to obovoid, style 3-branched: caps. loculicidal, many-seeded. (Belamcan-da: made from native E. Asian name.)

**B. chinensis**, DC. BLACKBERRY-LILY, from the cluster of large shining round black seeds that remain when the caps. splits: st. 2–3 or 4 ft.: lvs. equitant, sword-shaped, 1 in. broad, many-nerved: fls. 1 $\frac{1}{2}$ –2 in. across, fugitive, segms. obtuse at apex and narrowed at base: caps. about 1 in. long.



5. **IXIA**, L. (*Hyalis*, Salisb.) Cormous plants from S. Afr., probably 25 species, with grass-like foliage and spikes or paniced racemes of showy rather small fls. in lilac, yellow, white, and other colors.—St. simple or branched in the infl., slender, mostly exceeding the linear distichous nerved lvs.: fls. open, tube long, short or almost none, 1-2 in. across, segms. about equal and oblong; stamens 3, inserted at throat, filaments short; ovary 3-celled, many-ovuled, style filiform and exceeding tube, the 3 branches short and curved: caps. small, loculicidal. (Ix-ia: Greek *bird lime*, perhaps referring to the juice of the species.)—Handsome plants for pots, frames, and spring bloom, usually not grown under specific names. The following two are closely related and belong to the group with dark-colored throat.

Fls. white or yellow.....1. *I. maculata*  
Fls. lilac.....2. *I. columellaris*

1. **I. maculata**, L. Corm tunicated, about 1 in. diam.: st. 1-2 ft., mostly simple or nearly so: lvs. 6-12 in. long,  $\frac{1}{4}$  in. or less broad: fls. many, in a dense erect spike, yellow with very dark spot in throat, the oblong obtuse segms. about 1 in. long, tube very thin and slender and exceeding spathe; outer spathe-valve 3-toothed or -angled, inner 2-toothed.—It runs into color vars., with segms. red or purple outside, segms. white but throat nearly black or yellow with brown throat.

2. **I. columellaris**, Ker. Differs in color, the fls. lilac- or mauve-purple, throat blue.

6. **BABIANA**, Ker. Nearly or quite 30 cormous species of low stature, all but 1 in S. Afr., one of which is sometimes planted for the handsome spicate fls. in spring.—Sts. simple, or branched in the infl., slender: lvs. several on the st., plicate and strongly ribbed, mostly hairy, sometimes narrowed to petiole: fls. prevailingly lilac but running to yellow, pink and reds, 1 to a small spathe; perianth with slender tube broadening at top, the 6 oblong or oblanceolate segms. nearly equal; 3 stamens inserted near throat, mostly shorter than segms.; ovary 3-celled, many-ovuled; style-branches short and simple, usually flattened at tip: caps. loculicidal. (Babia-na: Dutch for *baboon*, which is said to eat the bulbs or corms.)

**B. stricta**, Ker. Corm  $\frac{1}{2}$  in., long-necked, covered with fibers: st. 6-12 in., bearing 1-3 spikes and hairy ribbed spathe-valves  $\frac{3}{4}$  in. or less long: lvs. shorter than st., sword-shaped, hairy: fls. red or lilac (color forms), funnel-shaped tube equaling or exceeding spathe; segms. obtuse,  $\frac{3}{4}$ -1 in. long; stamens about half as long as segms. S. Afr.

7. **ACIDANTHERA**, Hochst. About 18 species in trop. and S. Afr., one sometimes grown for summer bloom.—Cormous, with linear lvs. and fls. in a loose spike, on a somewhat leafy erect usually simple st., the spathe-valves long and green: fls. whitish, pink, yellowish, to purple, usually with a long cylindrical tube only slightly dilated upwards; segms. nearly or about equal, spreading, oblong; 3 stamens in throat, filaments slender, the connective of the anthers sometimes produced as a cusp; ovary 3-celled, many-ovuled; style long, the 3 branches short and simple and flattened at end: caps. oblong, loculicidal. (Acidanthe-ra: Greek *cusp* and *anther*.)

**A. bicolor**, Hochst. Corm 1 in. diam., with brown tunics: st. simple, 1-1 $\frac{1}{2}$  ft. long, bearing 1 or 2 small lvs., and very loose few-fl. spike, the outer spathe-valve 2-3 in. long: fls. creamy-white, blotched chocolate-brown within, the slender tube 4-5 in. long; segms. 1 $\frac{1}{2}$  in. long, acute; stamens nearly as long as segms. Trop. Afr.

8. **SPARAXIS**, Ker. WAND-FLOWER. Much like *Babiana* and *Tritonia*, without hairy plicate lvs. as in the former, and with lacerate (cut-lobed) spathe-valves which the other two do not have, the valves wrapped about ovary and short upwardly funnel-shaped perianth-tube; style exceeding tube, the 3 very slender curved branches entire: a series of forms in S. Afr. that may be covered

as one variable species or treated as four or five species. (Sparax-is: Greek, denoting the torn spathe-valves.)

**S. tricolor**, Ker. (*Ixia tricolor*, Curt.). Corm about  $\frac{3}{4}$  in. diam., with white tunics: st. 6-18 in. long, simple or forked, with 2 or 3 small lvs. toward base: radical lvs. lanceolate to linear, 6-12 in. long: fls. few, from spathes  $\frac{1}{2}$  in. long, with yellow throat and dark blotch at base of each segm., otherwise the segms. dark purple, tawny or yellow tinted brown-purple, or sometimes white with purple on upper part outside.

9. **TRITONIA**, Ker (*Montbretia*, DC.). S. African plants of perhaps 40-50 species, a few grown for the showy summer bloom.—Corm with reticulated tunics: sts. usually branched and with many sheathing linear or sword-shaped lvs. toward base, the spathe-valves not lacerate but toothed at tip: fls. pink, yellow, tawny, red, white, or otherwise, in simple or paniced spikes; perianth with narrow short or long tube that dilates at top; segms. oblong or obovate and nearly equal, in some species with a callus or process on the 3 lower ones; 3 stamens inserted at base of funnel; ovary 3-celled, many-ovuled, the style-branches short and simple: caps. loculicidal. (Trito-nia: *weather-cock*, alluding to variable direction of stamens in different species.)

**T. crocosmæflora**, Lemoine. The common montbretia of gardens, hybrid of *T. Pottsii* and *Crocasmia aurea*, blooming first in 1880 in France: st. slender, branching, 3-4 ft., equaling or exceeding the broad-linear or sword-shaped lvs. which are  $\frac{1}{4}$ -1 in. broad: fls. orange-crimson,  $1\frac{1}{2}$ -2 in. across, variable in size and shape as well as in length of stamens and style; tube curved, shorter than the oblong usually spreading segms. or sometimes much longer than the nearly erect small segms.; the segms. are sometimes darker colored or barred below middle.—Apparently the forms exhibit one or the other parent; the specific name suggests that it is supposed to be *crocosmia*-flowered. **T. Pottsii**, Baker, has bright yellow-red fls. with broad tube twice longer than the segms.; stamens reaching half-way the length of segms.; style-branches longer than stamens.

10. **CROCOSMIA**, Planch. One species in trop. and S. Afr., distinguished from Tritonia by spathe-valves not notched or cut, tube of perianth little dilated upward, and few rather than many seeds. (Crocos-mia: Greek *saffron smell*, when the dried fls. are placed in water.)

**C. aurea**, Planch. St. 2-4 ft., branched, with only few small lvs., spathe-valves brownish, acute, about  $\frac{1}{4}$  in. long: radical or basal lvs. shorter than st., linear or sword-shaped: fls. bright orange-yellow; tube  $\frac{3}{4}$ -1 in. long, exceeded by the oblong-lanceolate wide-spreading segms.; stamens and style equaling segms.

11. **ANTHOLYZA**, L. About 20 species of cormous summer-bloomers from trop. and S. Afr., with long-tubular curved perianth.—St. usually simple, sometimes branched, bearing fls. in a spike, the spathe-valves entire: lvs. linear or sword-shaped: fls. usually red, very long and slender; tube filiform and base and remainder cylindrical; segms. generally unequal, sometimes markedly so, uppermost longest; 3 stamens inserted in tube; ovary 3-celled, many-ovuled; style with simple branches flattened at tip: caps. thin, loculicidal. (Antholy-za: Greek *raging flower*, alluding to the gaping mouth of perianth.)

**A. æthiopica**, L. Corm large and globose with thin brown tunics: st. 3-4 ft., usually branched above, spathe-valves greenish,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long: basal lvs. in rosette, sword-shaped,  $1-1\frac{1}{2}$  ft. long and 1 in. broad: fls. red-yellow,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, the slender tube part  $\frac{1}{2}$  in. or less long, the cylindrical curved part 1 in. long; upper segms. long and slender,  $1-1\frac{1}{4}$  in., continuing the curve of the tube, the other 5 much smaller,  $\frac{1}{2}$  in. or less long, spreading; stamens and style equaling or exceeding upper segms. S. Afr.

12. **GLADIOLUS**, L. Probably about 200 species in the Medit. region and trop. and S. Afr., the Cape being especially rich; certain of the species have given rise to the many vars. grown in the open for summer bloom and also for forcing under glass.—Corm tunicated: st. erect, mostly simple, more

or less leafy, with large usually herbaceous spathes (bracts) each yielding 1 sessile fl.: lvs. mostly sword-shaped, sometimes linear or terete: fls. commonly showy, red, purple, yellow, white, and other colors, with dilating funnel-shaped tube, curved upward in most species; segms. usually oblong, obtuse or acute, the 3 upper prominently larger than the 3 lower; 3 stamens inserted below throat; ovary 3-celled, many-ovuled; style slender, with short simple branches expanded at tip: caps. large, oblong to obovoid, loculicidal; seeds mostly flattened or winged. (*Gladiolus*: Latin *small sword*, used here originally because of the sword-like lvs.)—The garden gladioli do not represent any one species. They have been derived by variation and hybridization from several species. It is, therefore, impossible to give them clear botanical names. The beginning of the modern cult. gladioli was the introduction of *G. gandavensis* (from Gand or Ghent, Belgium) in 1841, itself a hybrid, although *G. Colvillei*, another hybrid, was of earlier origin and is apparently yet represented in cult. Of the species of *Gladiolus*, *G. primulinus* is probably most nearly preserved in garden stock; it is of relatively recent introduction, although now much represented in hybrids. A hybrid with marked characters may be introduced under a Latin name, but by subsequent hybridizations it becomes blended in other hybrids and its original character is modified or lost. Probably none of the old named hybrids is now in cult. in its original form.—The hort. gladioli are strong-growing erect plants, with large oblate or flattened corms: st. mostly simple, sometimes sparingly branched, 2–4 ft. and usually exceeding the rather rigid sword-shaped lvs. which are 1–2 in. broad and strongly many-nerved: fls. 2–8 in. across, in many colors, mostly in shades of purple, red and yellow, sometimes white, the segms. variously shaded, lined and blotched; upper segms. often hooded; spike with few or many fls. that open from the bottom upward, mostly one-sided but sometimes distichous: caps.  $\frac{3}{4}$ –1 $\frac{1}{4}$  in. long, shorter than the very acute lanceolate outer spathe-valve but sometimes nearly or quite equaling the inner one.

Several flower-forms and color-marks are characteristic of present garden gladioli, represented by such historic names and groups as here described; but with the continuing breeding, it is impossible to refer all the named vars. to definite groups. Vars. with ruffled fls. are now produced. The cultivars are many, and other groups than the following are recognized by fanciers.

|  |                          |
|--|--------------------------|
| Color prevailingly clear light yellow.....               | 1. <i>G. primulinus</i>  |
| Color not characteristically clear yellow.               |                          |
| Fls. hooded (upper segms. more or less arching over).    |                          |
| Blooms red and reddish-yellow, not purple, streaked..... | 2. <i>G. gandavensis</i> |
| Blooms running into purple, blotched.....                | 3. <i>G. Lemoinei</i>    |
| Fls. wide open, spreading, not hooded.                   |                          |
| Size of fls. very large; segms. broad.....               | 4. <i>G. nanceianus</i>  |
| Size small; segms. narrow, long-acute.....               | 5. <i>G. Colvillei</i>   |

1. *G. primulinus*, Baker. Fls. clear primrose-yellow throughout; tube 1 in. long, much curved above; 3 upper segms. ovate or obovate-acute, hooded; 3 lower segms. deflexed and much smaller. Trop. Afr.; subsequently considered by Baker as a color form of *G. Quartinianus*, Rich.—It has entered into the recent hort. gladioli, with its characteristic yellow.

2. *G. gandavensis*, Van Houtte. Late- or summer-flowering, with long spikes: fls. red and reddish-yellow, variously streaked and lined; segms. obtuse or short-acute, the upper ones horizontal or somewhat hooded.—Hybrid, supposed to be between *G. psittacinus*, Hook., and *G. cardinalis*, Curt., S. African species, perhaps then or subsequently with infusion of *G. oppositiflorus*, Herb., also S. Afr. The basic race on which modern gladioli apparently rest.

3. *G. Lemoinei*, Hort. Known by the purple blotches on the lower segms.; colors tinted white to bright yellow, red and purple; perianth somewhat bell-shaped, the upper ones either projected forward horizontally or strongly hooded; segms. broad and heavy.—Cross of *G. gandavensis* and *G. purpureo-auratus*, Hook,

f., the latter from S. Afr., at the nurseries of Victor Lemoine, Nancy, France, in 1875.

4. *G. nanceianus*, Hort. Characterized by very large open wide-spreading fls., not hooded or bell-shaped, upper segm. long and upright, 2 side segms. widely flaring and measuring 4-8 in. from tip to tip; color brilliant shades of red and purple, more or less blotched.—Cross of *G. Lemoinei* and *G. Saundersii*, Hook. f., the latter from S. Afr., at the Lemoine establishment at Nancy, made in 1883. Of similar parentage as No. 3 is *G. Childsii*, Hort. (*G. Leichtlinii*, Hort.), a race with large wide-open fls. and very broad segms.; it had much influence on the development of gladioli in N. Amer., but is now little separated as a race. As originally known, *G. Childsii* had highly colored fls. in shades of red with variegated and spotted throats, but lighter colors later developed; plants of great vigor and size. It originated with Leichtlin, Germany, first blooming in 1877.

5. *G. Colvillei*, Sweet. Early-flowering, with short spikes: fls. open or flaring, not distinctly hooded, segms. oblong-acute and spreading, scarlet with long yellow blotches at base of lower segms., running into white.—Raised in 1823 at Colville's nursery, Chelsea, England, the progeny of *G. concolor*, Salisb. × *G. cardinalis*, Curt., both from S. Afr. This race is used for growing under glass. It is a marked race, with relatively small fls. and narrow spreading sharp segms.

13. **WATSONIA**, Mill. (*Meriana*, Trev.). Erect simple-stemmed or branching herbs of S. Afr., with spikes of showy fls., probably 20 to 30 species.—Gladiolus-like, but differing in the divided style-branches, perianth regular or essentially so, and the tube much more evident and curved; segms. spreading, oblong, nearly or quite equal and alike: fls. large and showy, in terminal and lateral open or spike-like racemes, red varying to white: spathe-valves rigid and entire, usually not lf.-like. (Watsonia: Sir William Watson, 1715-1787, English botanist.)—The forms in cult. are confused, but the following two types appear to be mostly represented.

Tube of perianth only little expanding toward the segms. so that it is nearly or quite cylindrical.....1. *W. iridifolia*  
Tube much widening upward, so that it is funnel-shaped.....2. *W. rosea*

1. *W. iridifolia*, Ker. (*W. Meriana*, Mill., var. *iridifolia*, Baker). Corm 1-1½ in. diam.: st. 3-4 ft., usually branched, bearing a few lvs. toward base, the terminal spike or raceme with 12-20 or more fls.: radical lvs. long sword-shaped, about 1 in. broad, many-nerved: fls. pink, 2-3 in. long, ascending or wide-spreading, pink, the segms. much shorter than tube, and the tube several times exceeding dry obtuse or short-acute spathe-valves; anthers included; style not as long as segms.—Var. *O'Brieni*, N. E. Br. Fls. pure white; known also as *W. alba* and *W. Ardernei*, the plant having been cult. in England by J. O'Brien and in S. Afr. by H. W. Arderne.

2. *W. rosea*, Ker. Fls. rose-red, prominently funnel-shaped or broadened under the segms., which are as long as the tube.

14. **FREESIA**, Klatt (*Nymanina*, Kuntze). One variable species, of 4 or 5 segregates, in S. Afr., much grown under glass by florists.—Small plants, with bulb-like tunicated corms: st. slender, branched, with few small lvs., producing a few very fragrant upright fls. in loose raceme-like spikes bent sidewise, the spathe-valves ½ in. or less long and scarious: lvs. linear, ½ in. or less broad: fls. narrow-funnelform, 1-2 in. long, the tube very slender for some distance beyond spathe and then rather abruptly expanding; limb half or less as long as the expanded part of the tube, irregular, central upper segm. being broad and obtuse; 3 stamens inserted below throat, about equalling tube; ovary 3-celled, style slender, style-branches short and bifid: caps. small, loculicidal. (Free-sia: probably a personal name.)—By crossing between the different races or species, various "colored freesias" have been produced.

Segms. yellow or white.....1. *F. refracta*  
Segms. bordered rose-purple.....2. *F. Armstrongii*

1. *F. refracta*, Klatt. Corm ovoid or conical, with heavy tunics: st. weak, 1-1½ ft. high, about the length of the lowest lvs., bearing a few shorter lvs.: fls.



on a horizontal or sidewise rachis, greenish-yellow to bright yellow, tube abruptly narrowed below the middle, the segms. distinctly unequal; spathe-valves narrow, not covering the ovary.—Var. *odorata*, Baker, has bright yellow fls. with abruptly narrowed tube, the segms. less unequal, spathe-valves broader and covering the ovary. Var. *alba*, Baker, has large pure white fls. with tube gradually narrowed and segms. nearly equal. Var. *Leichtlini*, W. Miller (*F. Leichtlini*, Klatt.) has large pale yellow fls. and an abruptly narrowed perianth-tube. Var. *xanthospila*, Voss (*F. xanthospila*, Klatt), is like var. *alba* in color but has abruptly narrowed tube.

2. *F. Armstrongii*, W. Wats. Tube of fl. white with orange at base; segms. strongly margined with rose-purple. Bears the name of W. Armstrong of S. Afr., who sent corms to England.

15. **LAPEIROUSIA**, Pourr. (Incl. *Anomatheca*, Ker). About 50 species in trop. and S. Afr., one or two of which may be found in gardens.—Cormous small plants on the order of *Ixia* and *Freesia*, with distichous flat or linear or even subterete lvs., and rather small fls. in summer, mostly red or blue: spathe-valves bract-like, small or large: perianth tubular, long or short, the tube slender throughout or only slightly enlarged under the spreading essentially equal segms.; stamens inserted in throat, the filaments short, anthers basifixed; ovules many, style slender, each of the 3 branches bifid: caps. small, 3-valved, loculicidal. (Lapeirousia: Jean Francois Galoup de Lapeyrouse, French naval officer of the 18th century; usually written Lapeyrousia, but not so spelled by the founder of the genus.)

*L. cruenta*, Baker (*Anomatheca cruenta*, Lindl.). Lvs. several, from the base, thin and flat, 6–12 in. long and  $\frac{1}{4}$ – $\frac{5}{8}$  in. broad, about equaling the slender simple scape: fls. few in a second open spike or raceme, red; tube 1–1½ in. long, very slender, two to three times exceeding the green spathe-valves. S. Afr.

16. **CROCUS**, L. Well-known earliest spring “bulbs,” also several autumn-blooming kinds, opening in sunshine, from the Medit. region and S. W. Asia; probably 75 species; many species have been grown by fanciers, but the common crocuses are not more than 4 or 5.—Corm globose or depressed, tunicated: st. none above ground, the fls. produced at the surface among the linear grass-like lvs., or preceding them, which lengthen after blooming, or after the lvs. in the case of autumn-blooming kinds: spathe sometimes lacking: fls. white, yellow, lilac, with a long slender tube that raises the expanded part above ground; segms. 6, nearly or quite equal; 3 stamens included, inserted in throat of tube; ovary 3-celled, many-ovuled; style long, the 3 stigmas either nearly entire or much divided: caps. small, mostly oblong, loculicidal, ripening at or beneath the surface. (Cro-cus: Greek name of the saffron, *Crocus sativus*.)

Blooming in spring.

Fls. lilac, purple, or white.

Throat yellow-tinged, slightly bearded.....1. *C. biflorus*

Throat not yellow, pubescent.....2. *C. vernus*

Fls. yellow, at least inside.

Outer segms. flushed or striped brown outside.....3. *C. susianus*

Outer segms. not flushed or striped.....4. *C. masiacus*

Blooming in autumn.....5. *C. sativus*

1. *C. biflorus*, Mill. Spathe of 2 valves or bracts: fl. tinged in shades of purple, the outer segms. with 3 stripes of purple on the back; segms.  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. long; throat faintly bearded, tinged yellow; anthers and filaments orange; style-branches entire. Italy to S. W. Asia, variable.—Formerly called “Scotch Crocus” although not from Scotland.

2. *C. vernus*, All. Spathe of 1 long valve: fl. lilac or white, often striped purple, throat pubescent, never yellow; segms.  $1\frac{1}{2}$  in. long; anthers lemon-yellow, filaments white; style-branches entire or fringed. S. and Cent. Eu.; common in gardens.

3. *C. susianus*, Ker. CLOTH-OF-GOLD CROCUS. Spathe of 2 valves: fls. bright orange-yellow with brownish tube; segms.  $1\frac{1}{2}$  in. long, soon becoming reflexed, flushed or striped brown outside; anthers orange; style-branches surpassing the anthers. (Susianus: see *Iris susiana*, p. 192.) Crimea.

4. *C. mœsiacus*, Ker. Spathe of 2 valves, the inner valve sometimes minute: fls. bright yellow not striped (unless in hort. variants); segms.  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. long, very obtuse; anthers pale yellow, hastate at base; style-branches not equaling the anthers. S. E. Eu., Asia Minor.—Sometimes called "Dutch Crocus," although not from Holland.

5. *C. sativus*, L. SAFFRON CROCUS. Autumn-blooming: lvs. ciliate on edge: spathe of 2 valves: fls. lilac or white, throat of same color and pubescent; segms.  $1\frac{1}{2}$ –2 in. long; anthers yellow, exceeding filaments; style-branches bright red, entire, equaling the segms. Asia Minor.—The prominent style-branches yield saffron.

## 29. MUSACEÆ. BANANA FAMILY

A half dozen genera and 60 or more species of the tropics of both hemispheres, a few of them striking ornamental plants, two producing the bananas of commerce and one yielding important fiber.—Stout usually perennial herbs, or partially woody, often of gigantic stature, the st. sheathed by the petioles or lf.-bases: lvs. mostly large, entire, pinnately-nerved, the blade sword-shaped to lanceolate or oblong: infl. spicate or paniculate, subtended by spathes, heavily and often peculiarly bracted, the fls. mostly sessile or nearly so and each one either small-bracted or bractless; fls. bisexual or plants monœcious, borne in axils of large bracts; the perianth clearly differentiated as calyx and corolla, the sepals mostly 3 and united or free; petals 3 or less, free or somewhat united; stamens 6, 1 of them a sterile staminode and the others anther-bearing, all free; ovary inferior, 3-celled, the ovules single or mostly many; style simple, but stigma often 3- or 6-lobed: fr. either baccate or capsular, indehiscent, dehiscent, or separating into 3 carpels.

Plant more or less tree-like (but with several trunks in the clump), the lvs. alternately or spirally arranged: fls. mostly unisexual or imperfect by abortion so that the plant is monœcious, borne several together under bracts: fr. long and fleshy.....1. *MUSA*

Plant tree-like, the great lvs. distichous at top of trunk: fls. bisexual, in a boat-shaped bract: fr. capsular, 3-valved.....2. *RAVENALA*

Plant not tree-like, with few or many sts. or canes: lvs. variously placed but usually not markedly distichous at summit: fr. capsular or semi-baccate.

Fls. gaudy, protruding with long points from an oblique or horizontal sheath (bract): caps. 3-valved.....3. *STRELITZIA*

Fls. usually not long-pointed and showy: caps. indehiscent, or separating into 3 berry-like parts.....4. *HELICONIA*

1. *MUSA*, L. Fifty or more robust and rapidly-growing species in the tropics of the eastern hemisphere, comprising ornamental subjects and plants yielding food and fiber, some of them stoloniferous and forming large clumps.—Rhizomatous or bulb-form at base: sts. 1 or several, each blooming once, stout, short or tall, sometimes of great height: lvs. spirally arranged and the great bases successively sheathing forming the trunk, the blade long, large and heavy, with age splitting transversely in the wind: infl. terminal, emerging from the leafy sheaths, in the form of a long drooping or erect spike bearing flat clusters of fls. underneath broad colored bracts; fls. unisexual by abortion, the upper clusters on the rachis functioning as males, the lower fertile and giving rise to the "hands" of fr.; calyx tubular but soon splitting down one side to base; corolla represented by a single opposed petal, entire or toothed; stamens usually 6, 1 a staminode: fr. a long berry-like indehiscent body with few or many seeds, in the cult. bananas seedless. (Mu-sa: Antonio Musa, physician to Octavius Augustus, first emperor of Rome, 63–14 B. C.)—*M. textilis*, Née, the Abacá or Manila Hemp, extensively grown in the Philippines (where it is endemic) for the fiber in the sheathing lf.-bases, is a plant reaching 20 ft., with oblong often spotted lvs. glaucous beneath, and a short drooping spike; outer calyx-lobes with short horn-like hooks: fr. not edible, 2–3 in.

long, 3-angled and curved, seedy. Other species of *Musa* are sometimes planted for ornament.

Grown for the edible fr., stoloniferous, spreading in clumps.

Plant dwarf, usually not exceeding a man's height: petiole 6 in. or

less long. ....

Plant tall: petiole 1 ft. or longer. ....

Grown for ornament, not stoloniferous: fr. not edible. ....

1. *M. Cavendishii*

2. *M. paradisiaca*

3. *M. Ensete*

1. **M. Cavendishii**, Lamb. DWARF BANANA. Dwarf and compact, usually not over 6 ft., stoloniferous, the st. 5-6 in. thick: lvs. spreading, 2-4 ft. long and 1-2 ft. broad, somewhat glaucous, more or less spotted and colored when young: spike drooping, short, with red-brown bracts 3-6 in. long and very broad: calyx yellowish-white, 1-1½ in. long, the free petal half as long: frs. very many in a bunch or spike (often 200 or more), 4-5 in. long, 6-angled, somewhat curved, fragrant, seedless. (The Duke of Devonshire—family name Cavendish—became the owner of one of the two original plants.) S. China.—Not to be confused with small-fruited forms of the tall or common banana. Hardier than the tall banana; much grown in Bermuda, and planted in S. U. S.

2. **M. paradisiaca**, L. (*M. sapientum* var. *paradisiaca*, Baker). PLANTAIN. Plant tall, 10-30 ft., stoloniferous, the st. thick and heavy: lvs. erect or ascending, 5-9 ft. long, 1½-2 ft. broad, bright green: spike drooping, 2-5 ft. long, bracts red or violet, 6-12 in. or more long, lanceolate, oblong-lanceolate or ovate-lanceolate, the male fls. and their bracts nearly or quite persistent; calyx yellowish-white, mostly 1½-2 in. long, the free petal usually more than half as long: frs. usually less than 100 in a bunch or spike, 8-14 in. long, hard and mostly strongly angled, yellowish-green, edible when cooked, seedless. (*Paradisiaca*: of paradise; i. e., of gardens.) Native in India, but widely cult. in tropics.

Var. **sapientum**, Kuntze (*M. sapientum*, L.). BANANA. Male fls. and bracts deciduous: fr. yellow at maturity, sweet and edible without cooking, seedless. (*Sapientum*: of men or mankind; literally, *of the wise men*.) Subvars. of this var. or race have red frs. (var. *rubra*), small thin-skinned "lady-finger" frs. (var. *Champa*), and many other forms. Some kinds are practically inedible and are seed-bearing. If a banana is cut across, the 3 carpels or cells may be made out, and dark-colored rudiments of seeds are usually visible. A crude fiber is produced in the lf.-sheaths.

3. **M. Ensete**, Gmel. (*Ensete edule*, Horan.). ABYSSINIAN BANANA. Stout plant, growing to a single st. or trunk 20-40 ft. high, swollen at base: lvs. very large, 10-20 ft. long and 2-3 ft. broad, oblong and acute-cuspidate: spike globose, erect, densely covered with dark reddish-brown bracts 8-12 in. long; fls. many to a bract, in 2 series, whitish, 1½-2 in. long, with 3-lobed calyx and corolla: fr. dry, 2-3 in. long, inedible, with a few very large black seeds ¾-1 in. long and having a sunken area on one side. (*Ensete*: from the native name.) Abyssinia; largest known species.

2. **RAVENALA**, Adans. Two species, one in Madagascar, the other in Guiana and Brazil, the former planted in warm countries for its striking appearance.—Trunk palm-like: lvs. immense, musa-like, in 2 ranks toward top of st., giving the plant a narrow fan-like aspect, the long petioles little sheathing: infl. in the axils, much shorter than the lvs., the bracts stiff and boat-like, one above the other in heavy distichous spikes; fls. bisexual, whitish, several from each bract, of elongated stiff free parts; sepals 3, equal, 6-8 in. long; petals 3, the lateral ones like the sepals, the other shorter; stamens 6 in the Madagascar species, 5 in the American, 4 or 5 in. long: fr. a 3-celled woody caps. with many seeds. (*Ravena-la*: the name in Madagascar.)

R. **madagascariensis**, Gmel. TRAVELERS-TREE, so-called because the cup-like lf.-bases hold water which travelers are said to drink; trunk rising 30 ft. and even more, making a striking and unmistakable object. Madagascar.

3. **STRELITZIA**, Banks. BIRD-OF-PARADISE FLOWER. About 5 S. African plants, two grown under glass and in the open far S. for the odd and showy infl. and the banana-like lvs.—Perennial, the trunk sometimes more or less woody, often wanting: lvs. distichous, the long petiole channeled: fls. several in a rigid boat-like spathe-bract on a long or short peduncle, bisexual and very irregular; sepals 3, yellow or white, narrow-lanceolate and long-pointed, much

projecting; petals 3, 1 small the other 2 conniving to form an arrow-shaped organ (the "tongue") in the groove of which the stamens and style lie; stamens 5, perfect; ovary 3-celled, style 3-branched, ovules many: caps. 3-angled, loculicidal. (*Strelitzia* Reginæ: dedicated to Queen Charlotte Sophia, of the house of Mecklenburg-Strelitz, wife of George III.)

Outer parts of fl. (sepals) yellow; tongue blue.....1. *S. Reginæ*  
Outer parts and tongue white.....2. *S. augusta*

1. *S. Reginæ*, Banks. Trunkless: lf.-blades oblong-lanceolate, 10-18 in. long, acute at apex, rounded or cuneate at base, 4-6 in. broad, the petiole very long: scape nearly or quite as long as lvs., with sheaths, the upper floral one oblique, 6-8 in. long, from which the long-pointed fl.-parts stand erect; sepals 3-4 in. long, yellow; tongue of similar length, auricled on either side, dark blue, the stamens not exerted, the 3 style-branches projecting.—The commonest species in cult.

2. *S. augusta*, Thunb. Plant larger, with trunk a few in. to several ft. high: lf.-blades 2-4 ft. long and 1-2 ft. broad, banana-like, the petiole deeply wing-channeled: scape short; spathe purplish, 10-15 in. long, the projecting fl.-parts white, the sepals 5-8 in. long.—*S. Nicolai*, Regel & Koern., is a still larger species with white sepals and blue tongue.

4. **HELICONIA**, L. (*Bihai*, Adans. *Bihai*, Kuntze). Thirty to 40 species in the American tropics, sometimes planted for the large banana-like foliage and showy fl.-bracts.—The genus differs from the other cult. genera of the family in the acaulescent or slender-stemmed character (many long-stalked lvs. rising from the ground), and the usually blue caps. that breaks up into berry-like parts or frs.: fls. bisexual, few to several crowded in conduplicate or boat-shaped bracts on peduncles or scapes; sepals 3, free or somewhat united with corolla, the latter short-tubular and with 2 lateral lobes small and the third mostly wanting; perfect stamens 5; ovary inferior, with solitary ovules in each of the 3 cells, the style slender, stigma capitate or shallowly 3-lobed. (*Heliconia*: bears the name of Mt. Helicon, seat of the Muses; application fanciful.)

Lvs. plain green.....1. *H. Bihai*  
Lvs. striped yellow.....2. *H. aureo-striata*

1. *H. Bihai*, L. WILD PLANTAIN. BALISIER. Striking plant with many lvs. standing 10-15 ft. high, transversely ribbed, the petioles very long: bracts scarlet and showy, 4-12 in. long, distichous and alternate on the scape (which is about the length of the petioles), broad-clasping at base: fls. included in the bracts. (*Bihai*: native American name.) W. Indies, Cent. and S. Amer.; naturalized in oriental tropics.

2. *H. aureo-striata*, Bull. Perhaps a derivative of *H. Bihai*: at least nativity unknown. Lvs. more or less feathered or splashed along midrib with bright yellow and striped transversely following veins with same.

### 30. ZINGIBERACEÆ. GINGER FAMILY

About 40 genera and 400 or more trop. species, mostly in the Old World, a few of which are grown for the ornamental foliage and habit; ginger and other spices and condiments are derived from certain species.—Nearly all perennial rhizomatous herbs, with short mostly simple sts., the petiolate or sessile sheathing entire lvs. linear, lanceolate or oblong and mostly acuminate, with ligule at summit of petiole, radical and cauline: fls. bisexual, irregular, commonly in bracted spikes, heads or panicles, one or more under each bract; perianth of 6 parts, in a calyx series and corolla series; calyx tubular or somewhat spathe-like, generally 3-toothed; corolla tubular, unequally 3-lobed; fertile stamen 1, the 2 anther-cells sometimes separated by a connective; staminodia 1 and petal-like (lip), and sometimes more, in which case the lateral ones may be filiform or petal-like; ovary inferior, prevailing 1-celled, many-ovuled; style and stigma 1, the style held by the anther: fr. a loculicidal



often tardily dehiscent caps.—Aside from the following genera, species of *Costus* (with petal-like filament and infl. cone-like) may be planted far S.

- Lateral staminodes not petal-like, none, or small and toothed, or sometimes narrow and adnate to the lip.
- Filament of fertile anther short or nearly wanting and not petal-like: infl. cone-like.
  - The 2 anther-cells parallel, and the connective commonly produced into a long appendage.....1. **ZINGIBER**
  - The 2 anther-cells divergent above or pointing in different directions, the connective mostly expanded, crested or 2-lobed.....2. **AMOMUM**
  - Filament elongated: infl. not cone-like.....3. **ALPINIA**
- Lateral staminodes large and petal-like.
  - Connective between 2 anther-cells appendaged at base; filament of fertile anther petal-like.....4. **CURCUMA**
  - Connective not appendaged (nor crested); filament long and slender....5. **HEDYCHRIUM**

1. **ZINGIBER**, Adans. **GINGER**. Fifty to 60 species are recognized, in tropics of farther Asia to New Guinea.—Rootstocks tuberous, aromatic: sts. leafy: lvs. sheathing at base, oblong-lanceolate: infl. spicate, usually radical, but sometimes arising from the sides or apex of the st., the bracts persistent and commonly with 1 fl. underneath; calyx cylindrical and shortly 3-lobed; corolla cylindrical, the tube enlarged at summit, the lobes lanceolate; lip deflexed, entire, emarginate or shortly 3-lobed, the lateral staminodes (if present) very small and adnate to it; filament of anther short, the anther-cells joined by a long-spurred connective equaling or exceeding themselves, the spurs standing above the lip: caps. oblong or globose, 3-valved or rupturing irregularly. (Zing-iber: classical name, coming from the Sanskrit.)—The zingibers are little grown for ornament, although various species may be found in choice collections.

**Z. officinale**, Roscoe. **COMMON GINGER**, grown in trop. countries. St. 3 ft. or more high: lvs. lanceolate to linear-lanceolate, sessile, narrowing to base, 6-12 in. long and  $\frac{3}{4}$  in. broad: spike 2-3 in. long and 1 in. thick, dense, on a bracted peduncle shorter than foliage, the ovate green often yellow-margined bracts 1 in. long; corolla yellow-green, the segms. about  $\frac{3}{4}$  in. long, exceeding the purple yellow-spotted lip. Probably native in Pacific Isls., but widely cult. for the irregular rhizome.—**Z. Zerumbet**, Sm. is also cult. for its rhizome: the lvs. are broader and usually puberulent beneath, lip yellow.

2. **AMOMUM**, L. Nearly 100 species in farther Asia, one or two grown for habit and fragrant foliage.—From *Zingiber* the genus differs in the connective between the anther-cells not long-spurred although sometimes crested or 2-lobed or variously broadened, the cells diverging from each other at the top, the lip not 3-lobed: plants with leafy sts. and mostly densely-fld. spikes directly from the creeping rhizome and therefore beneath the foliage. (*Amomum*: from the Greek, referring to poison antidote, for which some of the plants may have been used.)

**A. Cardamon**, L. Plant 4-8 ft. tall, the st. less: lvs. sessile, glabrous, linear-lanceolate, 6-10 in. long, narrowed to a caudate apex: scape 2-4 in. long, with ovate-acute scales; calyx 3-lobed, the tube about equaling the silky ovary: corolla yellow, the narrow tube about  $\frac{3}{4}$  in. long; lip nearly  $\frac{3}{4}$  in. long, obovate. E. Indies.—Not to be confused with *Elettaria Cardamomum*, Maton, which provides the true cardamoms (seeds) used as spice, seasoning and in medicine, although inferior seeds of *A. Cardamon* may be substituted. The *Elettaria* is a larger plant with large lvs. pubescent beneath, and few-fld. loose spikes or panicles, connective without appendages.

3. **ALPINIA**, L. About 140-150 species in trop. Asia and Polynesia, a few grown in warm countries for ornament.—From *Zingiber* and *Amomum* it differs in bearing the spike or panicle terminating a tall leafy st.: calyx tubular and shallowly 3-toothed, corolla with cylindrical tube commonly not exceeding the calyx and the segms. narrow; lip spreading, often broad and showy; anther-

cells diverging at apex, the connective usually not prominent: fr. mostly indehiscent, dry or fleshy. (Alpinia: Prosper Alpinus was an Italian botanist, 1553-1617.)—The plant known in cult. as *A. Sanderæ*, Sand. (and sometimes as *A. vittata*), is known for its narrow upright lvs. 6-8 in. long and 1 in. or less broad, decolored or striped and marked white; botanical position uncertain. It has much the look of *Dracæna Sanderiana*, but that plant has white-margined caudate-pointed petiolate lvs. without ligules. Some authors consider the species of the eastern and western hemispheres to be not congeneric, in which case the name *Languas* holds for the Old World representatives.

**A. speciosa**, Schum. (*A. nutans*, Roscoe. *Renalmia nutans*, Andr. *Languas speciosa*, Small). SHELL-FLOWER. A striking plant from E. Asia, often seen in warm regions: sts. 6-12 ft. high, leafy, the lvs. oblong-lanceolate or elliptic-lanceolate, glabrous and shining, blades 1-2 ft. long and 2-5 in. broad, with long parallel veins: fls. fragrant, in a terminal spike-like at length nodding raceme with hairy rachis, orchid-like because of the crinkled yellow lip with red and brown variegations; calyx about 1 in. long; corolla white tinged purplish.

**4. CURCUMA**, L. Forty to 50 species in trop. Asia and Afr., mostly the former, and to Australia; strong herbs sometimes raised for foliage and habit and the showy bracts.—From the *Zingiber* tribe it is separated by the large petal-like lateral staminodia: rhizome tuber-bearing: st. none or very short: lvs. mostly large, lanceolate or oblong or only rarely linear: spikes dense, compound, terminated by a tuft of large colored bracts; fls. 2 or more to each bract, bearing 2 prominent lateral staminodes; calyx with short cylindrical minutely-toothed tube; corolla funnelform, with broad segms.; lip rounded, deflexed at tip; anther-cells close together, the connective spurred at base: caps. globular, 3-valved. (*Curcu-ma*: from a native name.)

Lvs. rounded at base.....1. *C. petiolata*  
Lvs. narrowed at base.....2. *C. longa*

1. **C. petiolata**, Roxb. Rhizome small: lvs. with petiole 6-12 in. long, the blade 6-10 in. and 3-6 in. broad, prominently rounded at base, strongly veined and curved: scape not exceeding radical petioles, 4-6 in. long and 2 in. diam., with green bracts except those of the tuft at top which are purple and showy; fls. yellowish-white, nearly as long as bracts, the corolla-tube 1 in. long, lip nearly orbicular. E. Asia.

2. **C. longa**, L. Rhizome large, yielding turmeric (condiment and dye): lvs. oblong or elliptic, narrowed at base, 12-18 in. long and 4-8 in. broad, the petiole equalling the blade: spike 4-7 in. long and 2 in. diam., the peduncle inclosed in petiole-sheath, bracts green except pale pink tuft: fls. pale yellow, equalling the bracts. Farther India; much cult. by E. Indians.

**5. HEDYCHIMUM**, Koenig. GINGER-LILY. Some 40 species in E. Asia and Malaysia, 1 in Madagascar, one of them much cult. in warm countries and also planted about ponds in N.—Belongs with *Curcuma* in the tribe having well-developed petal-like lateral staminodes, but differs in having very slender connective not spurred or crested and without crown of bracts on the spike: rootstock strong, more or less tuberous: st. long and bearing oblong or lanceolate distichous lvs.: fls. in a terminal spike or thyrses, sometimes few, the bracts ovate or oblong and large; calyx cylindrical, 3-toothed or -lobed; corolla slender-tubed with linear spreading segms. little longer than calyx; lip large, 2-3-lobed or -toothed; anther-cells near together: caps. globose, 3-valved. (*Hedychium*: Greek combination, *sweet snow*, from the color and fragrance of some species.)

**H. coronarium**, Koenig. GARLAND-FLOWER. Strong free grower, 3-6 ft.: lvs. sessile, oblong-lanceolate or lanceolate, 8-24 in. long and 2-5 in. broad, acuminate, finely pubescent or thinly hairy beneath: spike 6-12 in. long, imbricated with broad pointed green finally brown bracts, terminating the leafy sts.: fls. white and fragrant, the showy parts long-exserted, the corolla-tube 3 in. long, in summer and autumn.

India and the Malay Isls. and naturalized elsewhere.—Sometimes called Ginger-Lily and Butterfly-Lily. *H. Gardnerianum*, Roscoe, of India and sometimes grown, has light yellow fls. with long red filament, the corolla-tube little exceeding the bract.

### 31. CANNACEÆ. CANNA FAMILY

One genus, represented in the warm parts of both hemispheres, some of the species or derivatives much used for summer planting for sub trop. and floral effects.—Perennial erect strong branched or unbranched herbs with stately habit, branching and sometimes tuberiferous rootstocks, bearing large alternate broad entire lvs. with sheathing petioles: fls. mostly red or yellow, very showy in the improved cult. kinds, in a terminal spike, raceme or narrow panicle, very irregular; sepals 3, small and usually green, looking like bracts; petals 3, sepal-like, mostly narrow and pointed, green or colored, exceeding the sepals and alternate with them, one of them usually smaller than the others; floral parts more or less united at base into a tube; stamens represented by staminodia and comprising the showy part of the fl., 5 in number in the common cult. kinds (less in certain others), 3 (or 2) much enlarged and broadened and forming the main "petals," one mostly narrower and reflexed and forming the "lip," another still narrower and more or less coiled and bearing 1 fertile anther-cell on its side; style single and long, flat or club-shaped, prominent in the center of the fl.; ovary inferior, 3-celled, many-ovuled: fr. a 3-valved and mostly 3-angled papillose, warty, or somewhat bristly caps., bearing the persistent calyx. The Canna flower is explained at A in Fig. 7, page 126.

**CANNA**, L. Upwards of 50 species, mostly in the western hemisphere, some of them naturalized outside their native regions. (Can-na: ancient name of a reed or cane.)—The large garden cannas of the present day are the results of hybridization and breeding and are not referable to botanical species, although the marks of one or another species may be prominent in them. One of the earliest of the modern cult. cannas (1863) was an offshoot of *C. iridiflora*, probably a cross with *C. Warscewiczii*, known as *C. Ehemanni* (or *Ehmanni*) and as *C. iridiflora hybrida*. Several species have probably gone into subsequent crosses, the main ones of which are described herewith. At first cannas were grown for stature and foliage, but subsequently were bred for fls. and compact habit. The bronze or purple color of herbage appears to have come with *C. Warscewiczii*. The Ehemanni cannas crossed with probably *C. glauca* and others produced the Crozy or French cannas, whence have descended many of the cannas (*C. generalis*) of gardens.

Fls. hanging, very long-tubed.....1. *C. iridiflora*  
Fls. erect or essentially so, the tube various.

Petals becoming reflexed; tube long, prominent.

Showy parts of fl. ("petals") yellow; tube 2 or more in. long.....2. *C. flaccida*

Showy parts in various colors; tube shorter; cultigen.....3. *C. orchoides*

Petals remaining erect or strongly ascending; tube very short or none.

Plant glaucous throughout (less evident in No. 5).

Lvs. lanceolate: fls. yellow, not large; upper staminodia mostly less than  $\frac{1}{4}$  in. broad.....4. *C. glauca*

Lvs. broader: fls. various, the upper staminodia usually 1 in. or more broad: cultigen.....5. *C. generalis*

Plant not glaucous (except perhaps in infl.): lvs. oblong to elliptic: fls. typically red (running to orange).—The small-fl. cannas.

St. green, also lvs. on both surfaces.....6. *C. indica*

St. purple or bronze, as also lvs. either above or beneath or both.

Pedice of second fl. in pair bractless; upper staminodia

usually 2.....7. *C. Warscewiczii*

Pedice of second fl. 2-bracted; upper staminodia 3.....8. *C. edulis*

1. *C. iridiflora*, Ruiz & Pav. Tall, to 8 or 10 ft., st. and foliage green: lvs. very large, 3-4 ft. by 1-1½ ft. broad in full-grown specimens, widely spreading: panicle

of several drooping branches, with large branch-bracts; fls. large and pendulous, rose-color; tube of corolla slender,  $2\frac{1}{2}$  in. long, the lobes of equal length; upper staminodia 3, equaling or exceeding corolla-lobes, 1 in. or less broad. Peru.—Probably not in general cult., but a prominent parent in garden hybrids.

2. *C. flaccida*, Salisb. St. and foliage green, plant 4–5 ft.: lvs. oblong-lanceolate, 10–24 in. long and 4–5 in. broad: raceme loose and few-fld., simple, with very small bracts, erect; fls. yellow, showy, soft or flaccid in texture; sepals 1 in. long, the corolla-tube about twice as long, the petals nearly as long as tube and strongly reflexed; upper staminodia 3, rounded, 2–3 in. long, the lip orbicular. Swamps near the coast, S. C. to Fla.; it has contributed an important element to the orchid-fl. or Italia group of garden cannas.

3. *C. orchiodes*, Bailey. The orchid-fl. cannas, represented in Italia and other vars., derivatives from *C. flaccida* with other stocks: fls. very large, usually 5 or 6 in. across, bright yellow to deep red, striped and splashed, not clear white or pink; floral parts (staminodes) broad and soft, with flowing outlines, the lip funnel-form at base; tube 1 in. or more long, much exceeding calyx; petals reflexed after about the first day.

4. *C. glauca*, L. St. and foliage green and glaucous, the plant 5–6 ft.: lvs. narrow-lanceolate, 4 in. or less broad, very acute at apex, tapering to base, white hyaline-edged: raceme rather loose, erect, simple or forked, little exceeding the foliage, fl.-bracts orbicular; fls. clear unspotted yellow, narrow and erect, the green sepals  $\frac{1}{2}$  in. long; petals  $1\frac{1}{2}$ –2 in. long, the tube about  $\frac{3}{4}$  in. long; upper staminodia 3, entire,  $2\frac{1}{2}$ –3 in. long and  $\frac{3}{4}$  in. or less broad; lip narrow, emarginate. Mex. and W. Indies to S. Amer.; also more or less spontaneous about grounds in trop. Amer. It runs into red-tinged and also more or less spotted fls.

5. *C. generalis*, Bailey. The common flowering cannas, in many named vars.: fls. medium to large, in many colors; floral parts usually well separated in outline, narrow to broad, most of them erect or strongly upright; tube  $\frac{1}{2}$  in. or so long, little if any exceeding calyx; petals narrow, remaining erect or ascending.

6. *C. indica*, L. INDIAN SHOT. St. and foliage green and glabrous, plant slender, 3 or 4 ft. tall: lvs. oblong, about twice as long as broad: raceme nearly or quite simple, loose, fl.-bracts nearly orbicular, most of the fls. 2 together, fls. narrow and erect, small; petals about  $1\frac{1}{4}$  in. long, connate at base; upper staminodia 3, bright red, oblanceolate and entire, about 2 in. long; lip entire, orange spotted red. Trop. Amer.; supposed by Linnæus to be native in Asia and Afr. as well as in Amer.; considerably naturalized far S. in U. S. and in tropics.—One of the old-fashioned garden cannas, grown mostly for its foliage effects.

7. *C. Warscewiczii*, Dietr. St. and foliage purplish or brown-purple, pruinose or waxy-glaucous, plant 3–5 ft.: lvs. oblong, acute at apex, about twice as long as broad or sometimes a little more: raceme scarcely overtopping foliage, simple, not loose, the fls., or at least the lower ones, 2 together and the upper one without bracts, the fl.-bracts ovate-pointed, brown-purple, conspicuously glaucous; beneath the infl. is usually a spathe-like glaucous bract 4–6 in. long; fls. scarlet and more or less blue-tinged, erect and narrow, not large; petals about 2 in. long, oblanceolate, the tube short; upper staminodia 2 or 3, entire or nearly so, 2–3 in. long and  $\frac{1}{2}$  in. broad; lip oblanceolate, emarginate. (*Warscewiczii*: Von Warscewicz, a Pole, collector for Van Houtte of Belgium; died 1866.) Costa Rica to S. Amer.—More or less spontaneous in the S., and probably often confused with *C. indica*.

8. *C. edulis*, Ker. Rootstock bearing edible tubers: st. purple, very strong, to 8 or 10 ft. or more: lvs. mostly suffused purple beneath but usually green above, oblong, 1–2 ft. long, acute, usually more than twice longer than broad: raceme loose, simple or forked, with large sheath at base, fls. mostly 2 together and the upper one with 2 small bractlets, fl.-bracts oblong or nearly orbicular; fls. bright (staminodia varying to orange) red, erect and rather narrow; petals 2 in. or less long, tube very short; upper staminodia 3, oblanceolate,  $2\frac{1}{2}$  in. long and  $\frac{1}{2}$  in. or less broad, entire or emarginate. W. Indies, S. Amer.—Cult. for food under the name of *Tous-les-mois*; grown also for foliage effects.

## 32. MARANTACEÆ. MARANTA or ARROWROOT FAMILY

Nearly 30 genera and something like 260 species in tropics of both hemispheres, largely American, one of which is grown in warm countries for its



starchy rhizomes and many others under glass and planted out for the interesting and showy foliage.—Perennial rhizomatous or tuberiferous herbs, stemless or caulescent: lvs. broad or narrow, pinnately nerved and narrowed to petiole, more or less distichous: fls. usually not showy, bisexual, very irregular, mostly in spike-like or head-like clusters, 1, 2, or more together, the infl. surrounded by spathe-like bracts; perianth parts 6, the 3 inner clearly differentiated as corolla; sepals free, equal or nearly so; petals usually joined into a long or short tube, the outer one commonly large and more or less hooded and colored or white; stamens mostly 6, of which 1 is fertile (bearing a 1-celled anther) and the others represented by petal-like irregular staminodia in 2 series; ovary inferior, 3-celled but 1 or 2 cells often abortive, ovule 1 in each cell; style slender and stigma simple: fr. capsular or baccate.—Many species and forms are grown under glass for the broad colored, barred, metallic or lustrous foliage; they may not bloom, and they are commonly named in Maranta but most of them are Calatheas. Aside from these 2 genera, few are represented in general cult. *Thalia dealbata*, Fraser, native in swamps of S. C. and Mo. south is sometimes planted in water-gardens: lvs. canna-like, ovate-oblong or narrower, the blades 8–20 in. long: scape 3–6 ft., branching above and pruinose, bearing many very irregular small dull violet fls.

Ovary with 1 developed cell.....1. MARANTA  
Ovary 3-celled.....2. CALATHEA

1. **MARANTA**, L. About 25 species, all of trop. Amer.—Low or tall herbs, caulescent or stemless, erect or prostrate: lvs. radical and cauline, the petioles sheathing at least at base: fls. in panicles or more or less branched infl.; upper conspicuous staminodia 2, exceeding petals; ovary 1-celled by abortion. (Maran-ta: B. Maranta was a Venetian physician and botanist; died 1754.)

Plant tall, with erect branching leafy sts.....1. *M. arundinacea*  
Plant low, stemless or nearly so, and lvs. practically radical.  
Blade of lf. with dark blotches midway.....2. *M. bicolor*  
Blade white-striped along veins.....3. *M. leuconeura*

1. **M. arundinacea**, L. ARROWROOT. Grown in tropics for the starchy rhizome which is a source of tapioca, and a form with yellow-variegated lvs. cult. by gardeners (often under the name *Phrynium variegatum*) for ornament; run wild in S. Fla.: sts. slender and much branching or forking, 2–6 ft.: lvs. ovate-oblong to ovate-lanceolate, acute, 6–12 in. long, prominently petioled: fls. scattered, small, white; upper staminode broad and emarginate, much exceeding the lip and corolla. S. Amer. and native probably elsewhere in trop. Amer.

2. **M. bicolor**, Ker. Low compact plant 10–15 in. high, bearing tubers at base: lvs. oblong, oval to elliptic and ovate, 3–5 or 6 in. long, rounded or cordate at base, margin more or less undulate, light purple beneath, glaucous-green above and with large brownish spots either side the midrib and a central lighter strip: fls. small, white with violet spots and striped. Brazil, Guiana.—Some of the stock cult. as *Calathea roseo-picta* belongs here.

3. **M. leuconeura**, Morr. Dwarf, very short-stemmed, about 1 ft. high, not tuberiferous: lvs. oblong to broad-elliptic, obtuse or very short acuminate, light green above and becoming white along the midrib and main veins, more or less spotted toward margins, beneath glaucous or purple: fls. small, white with more or less purple stripes. Brazil.—Var. *Massangeana*, Schum. Lvs. smaller, purple beneath: fls. smaller with deep violet upper staminode. Var. *Kerchoveana*, Morr. Lvs. larger, glaucous or red-spotted beneath: fls. large.

2. **CALATHEA**, C. F. W. Meyer. One hundred and more species, of trop. Amer. and Afr., mostly the former; popular foliage plants under glass.—Differs from Maranta in technical characters, as ovary fully 3-celled, upper staminode 1 and usually large, infl. mostly capitate or cone-like with spiral arrangement of bracts and borne among the lvs. (Calathe-a: Greek basket, probably bestowed in allusion to the basket-like setting of the fls.)—Favorite pot- and tub-

plants; the lvs. are rich in metallic hues, and many of them attractively barred, striped and blotched. They are cult. under many Latin names, some of which have no botanical standing. All the following are known also as Marantas. *C. Allua*, Lindl., is cult. in American tropics for the edible underground tubers.

- A. Plant very small, not more than 5-9 in. high. (No. 8 may be sought here.)
  - B. Lvs. oblong-lanceolate, 2-4 in. long, green. .... 1. *C. micans*
  - BB. Lvs. ovate to orbicular, 6-9 in. long, feathered or marked brown above: ..... 2. *C. roseo-picta*
- AA. Plant medium to large, mostly much more than 1 ft. high.
  - B. Mature lf. plain green above, not colored. .... 3. *C. ornata* (*C. imperialis*, *C. Sanderiana*)
  - BB. Mature lf. colored above, or shaded and metallic green, variously marked.
    - C. Upper surface of lf. striped from midrib toward margin, along or between the side veins (immature lvs. of No. 3 may be sought here).
      - D. Under surface green. .... 4. *C. vittata*
      - DD. Under surface violet, purplish or purple-red.
        - E. Lf. large, 1-2 ft. .... 5. *C. zebrina*
        - EE. Lf. small, 9 in. or less. .... 6. *C. Lietzei*
    - CC. Upper surface not striped, but variously feathered along the midrib or marbled or blotched.
      - D. Lf. continuously circled or zoned above, with a color-strip extending around the blade or either side of midrib.
        - E. Zone olive-green, pattern repeated on under surface. .... 7. *C. Lindeniana*
        - EE. Zone silvery-white, not repeated beneath.
          - F. Midrib feathered, whitish either side; blade ovate .... 8. *C. illustris*
          - FF. Midrib marbled whitish either side; blade elliptic. .... 9. *C. Vandenheckei*
      - DD. Lf. not zoned, with dark green blotches along midrib.
        - E. Under surface maroon-red. .... 10. *C. insignis*
        - EE. Under surface repeating pattern of upper surface. .... 11. *C. Makoyana*
      - DDD. Lf. not zoned, feathered from midrib above from bottom to top with white. .... 12. *C. medio-picta*
      - DDDD. Lf. not zoned, or continuously so, feathered with pale green and bearing olive-green blotches, pattern repeated underneath. .... 13. *C. Veitchiana*
  1. *C. micans*, Koern. Very small plant: lvs. 2-3 or sometimes 4 in. long, about 1 in. or less broad, oblong-lanceolate, acute or acuminate, green and shining above and somewhat feathered with white, paler green beneath: spike about  $\frac{1}{2}$  in. long; staminode violet. Brazil.
  2. *C. roseo-picta*, Regel (see *Maranta bicolor*). Small, 6-8 in. high: lvs. 4-8 or 9 in. long, nearly orbicular, dark green above with red rib and one or two zones of bright red near the margin, under side purple: spike about 3 in. long. Brazil.
  3. *C. ornata*, Koern. Strong vigorous plant,  $1\frac{1}{2}$ -3 ft. high: lvs. elliptic, more or less cordate at base, acute, 1-2 or 3 ft. long, the adult blades rich green above and dull purple-red beneath, the petiole becoming 2 ft. or more long with age: spike about 3 in. long, ovoid; staminode 2-lobed, yellowish. Guiana, Colombia, Ecuador.—The young foliage is usually striped pink between the veins, and the intermediate foliage striped white; names have been applied to the juvenile forms. *C. imperialis* and *C. Sanderiana*, Hort., are apparently variants of this species.
  4. *C. vittata*, Koern. Plant mostly dwarf, but sometimes 3 ft. tall: lvs. elliptic-lanceolate, 6-12 in. long, acute, light green above, but transversely striped with white from bottom to top, under side green shaded yellowish-green: spike ovoid, on a short peduncle; staminode broadly obovate. Probably Colombian.
  5. *C. zebrina*, Lindl. ZEBRA PLANT. Of compact and good habit, 1-3 ft. high, common under glass: lvs. elliptic, obtuse or very short-acute, 1-2 ft. long and nearly or quite half as broad, upper side velvety green and with alternating bars of pale yellow-green and olive-green extending outward from the midrib, under side purplish-red in the adult: spike nearly globular or ovoid; staminode pale lilac. Brazil.
  6. *C. Lietzei*, E. Morr. Dwarf in habit, 1-2 ft. high: lvs. elliptic and acute, 9 in. or less long, velvety green above and striped along principal veins with dark olive-green, feathered between veins with yellowish-green splashes, under side purplish-red: spike flattened, 2-3 in. long; staminode oblong, white. (Bears the name of M. Lietze, correspondent in Brazil of MM. Jacob Makoy of Belgium.) Brazil.
  7. *C. Lindeniana*, Wallis (often written *C. Lindeni*). Plant 3 ft. or so high: lvs. elliptic-oblong, 1 ft. or less long, short-acuminate, deep green above with olive-green zone either side of rib and a darker green zone between that and margin, under side with purplish zone repeating the pattern of upper zone: spike ellipsoid,

about 4 in. long; staminode yellow. (Bears the name of M. Linden, noted Belgian horticulturist.) Brazil.

8. *C. illustris*, Nichols. Dwarf and compact plant, usually 6–9 in. high, and by some writers regarded as offshoot of *C. roseo-picta*: lvs. ovate and acute, blade 4–6 in. long and 2–5 in. broad, upper side dark shining olive-green with metallic luster, midrib feathered with silvery-white and a zone of white circling the blade, under side dull red: spike nearly globular; fl. white blotched purple. Ecuador.

9. *C. Vandenheckei*, Regel. Compact in habit, 1–2½ ft. high: lvs. elliptic or elliptic-ovate, 9 in. or less long, acute, upper side dark green marbled silvery-white along rib and an irregular line or band of same (often very broad and almost filling blade) circling the lf., under side purplish-red: spike cone-like, 3–5 in. long; fls. white, more or less brown-striped. (Name bestowed in honor of M. Van den Hecke, president Royal Agricultural and Botanical Society of Ghent.) Probably Brazil.

10. *C. insignis*, Bull. Dwarf and compact, 1–3 ft. high: lvs. linear-lanceolate, 1 ft. long more or less, acute, upper side pale yellowish-green running on the margins to olive-green, with pinnately placed alternating short blotches of dark olive-green, under side dark maroon-red. Brazil.

11. *C. Makoyana*, Nichols. Showy plant, 2–4 ft. high: lvs. broad-oblong, obtuse or very short-pointed, upper side olive-green or cream-colored with oval, oblong or pear-shaped blotches of dark green extending outward from midrib, under side red but repeating the pattern. (Early cult. by Jacob Makoy & Co., Liege, Belgium.) Brazil.

12. *C. medio-picta*, Regel. Plant 20 in. or more high: lvs. oblong to oval-lanceolate, 6–8 in. long, tapering both ways, acuminate at apex, dark green above with midrib feathered white from bottom to top, under side pale green: spike nearly globular or ellipsoid, about 2 in. long; staminode obovate-oblong, obtuse, purplish. Brazil.

13. *C. Veitchiana*, Hook. f. Strong-growing spreading plant 1–4 ft. high: lvs. ovate to elliptic-ovate, the blade 8–12 in. long and about half as broad, very short-acute, upper side dark glossy green feathered on either side rib with very irregular band of pale green in which band are set large brownish frayed blotches, under side reddish and repeating the pattern: spike top-shaped, 2–3½ in. long; fls. white, with violet blotch on staminode. (Named in 1865 for the father of James Veitch, noted horticulturist of England.) Peru.

### 33. ORCHIDACEÆ. ORCHID FAMILY

A vast range of herbaceous plants, circling the world in temp. and trop. climates except in desert regions, terrestrial and epiphytic, many of them grown by florists, amateurs, and fanciers for the odd and showy bloom; the recognized species are more than 15,000, in several hundred genera. The distinctive mark of the orchids is the gynandrium, an organ formed by the union of pistil and stamens; this body is sometimes called the "column," although this term is also applied in other plants to an organ formed by the union of stamens alone; the gynandrium may be composed of 1 fertile stamen represented by an anther grown to the style, or (as in the *Cypripedium* tribe) of 2 stamens, and there may be staminodes inasmuch as the stamens are morphologically or originally 6; the pollen is mostly in masses (pollinia) that are removed by insects in the act of pollination; the style often ends in a beak or projection lying between the anther-cells or standing at the base of the anther. An orchid flower is explained in *E*, Fig. 7, page 126.—The orchids are perennials, with tuberous, bulbous, or mostly thickened roots, erect, prostrate, or climbing, most of them green, but a few leafless, decolorized and saprophytic: sts. sometimes with thickened internodes known as pseudobulbs; some of them have a monopodial growth, the st. elongating indefinitely from the terminal bud; other kinds are sympodial, each shoot coming to a stop and the growth continued by axillary shoots: lvs. various, linear, oblong, oval, or orbicular, more or less thick and fleshy, simple and entire, parallel-veined, alternate or scattered: fl.-st. basal or arising from axils on a leafy st., simple or branched: fls. usually bisexual, very irregular, often grotesque, highly specialized, showy in the cult. kinds, but very small and

inconspicuous in many of the species, subtended by a bract; 3 outer segms. (sepals) similar, usually narrow and not showy; 3 inner segms. (petals) with 2 similar lateral ones, and the third forming a lip which is sometimes saccate and often spurred; ovary inferior, mostly elongated and twisted, 3-celled or 1-celled by abortion: fr. a caps., mostly dehiscent, with very many minute seeds.—The native terrestrial orchids of the U. S. and Canada are sometimes used in bog- and rock-gardening, but they are not developed hort. subjects. The orchids of cult. are mainly trop. species, many of them epiphytes, together with numbers of hybrids; these species are in great numbers, and only the most usual kinds of flower-stores and conservatories can be entered here, with sufficient entries to illustrate some of the leading genera.

- A. Fertile stamens 2, and a broad staminode present. . . . . 1. CORDULA
- AA. Fertile stamen 1, and no staminode.
  - B. Infl. terminal, at the summit of the st. (sometimes from base of pseudobulb) or axillary in No. 8.
  - C. Lf.-buds conduplicate (the young lvs. folded together lengthwise).
    - D. Lvs. several-nerved. . . . . 2. SOBRALIA
    - DD. Lvs. 1-nerved.
      - E. Pollinia 4.
        - F. Lip joined to the column, at least at the base. . . . . 3. EPIDENDRUM
        - FF. Lip free from the column. . . . . 4. CATTLEYA
      - EE. Pollinia 8.
        - F. Anther inclined; stigma a pit on front of column. . . . . 5. LÆLIA
        - FF. Anther erect; stigma extending upward on 2 projections. . . . . 6. SOPHRONITIS
    - CC. Lf.-buds convolute (young lvs. rolled up in bud).
      - D. Blade of lf. distinctly jointed to petiole: plants erect or diffuse. . . . . 7. CÆLOGYNE
      - DD. Blade not jointed to petiole: climbing. . . . . 8. VANILLA
  - BB. Infl. on lateral branches, or else on special separate shoots.
    - C. Lf.-buds conduplicate (young lvs. folded together lengthwise in bud).
      - D. St. terminating its growth in a single year.
        - E. Lip rigidly or immovably united to base of column.
          - F. Base of lip closely parallel to column and perhaps adnate to it. . . . . 9. ODONTOGLOSSUM
          - FF. Base of lip spreading away from column.
            - G. The lip not lobed or only bifid, flat and broad. . . . . 10. MILTONIA
            - GG. The lip mostly 3-lobed, warted or cushioned at base. . . . . 11. ONCIDIUM
        - EE. Lip movably jointed to base of column.
          - F. Pollinia with caudicles and stipes: lvs. strap-shaped. . . . . 12. CYMBIDIUM
          - FF. Pollinia with either or neither caudicles or stipes, not with both: lvs. not strap-shaped. . . . . 13. DENDROBIUM
      - DD. St. increasing in length from year to year.
        - E. Lip movably jointed to column. . . . . 14. RENANTHERA
        - EE. Lip rigidly or immovably adnate to column.
          - F. The lip without spur. . . . . 15. PHALÆNOPSIS
          - FF. The lip spurred.
            - G. Column with a foot or lower part to which the lateral sepals are attached. . . . . 16. AERIDES
            - GG. Column footless. . . . . 17. VANDA
    - CC. Lf.-buds convolute (rolled).
      - D. Lip connate with column, forming a tube or broad top-shaped cavity. . . . . 18. CALANTHE
      - DD. Lip jointed to foot of column.
        - E. Callus-ridges lengthwise on disk. . . . . 19. LYCASTE
        - EE. Callus-ridges crosswise. . . . . 20. ZYGOPETALUM
      - DDD. Lip free from column but inclosing it, swollen or spurred behind. 21. PHAIUS
      - DDDD. Lip not attached to column but continuous with it and divided into 3 odd consecutive parts. . . . . 22. STANHOPEA

1. CORDULA, Raf. The glasshouse lady-slippers, commonly known as Cypripediums, but that genus is now restricted to species of the north temp. and boreal regions; the species of Cordula are about 50 in the tropics of farther Asia and to New Guinea, differing from Cypripedium in the conduplicate rather than convolute or rolled lf.-buds and in the deciduous rather than withering-persistent ovary.—Terrestrial or epiphytic herbs, with many basal oblong, elliptic or strap-shaped thick lvs., and 1-several showy saccate fls. on long peduncles: sepals 3, imbricate in bud, the dorsal erect and showy, the 2 lateral united; petals spreading or long and pendulous;



lip inflated, with the edges of the orifice not or rarely inflexed; ovary 1-celled: fr. a 3-valved dehiscent caps. (Cordula: a nymph.)—Some of the greenhouse lady-slippers are of the genus *Paphiopedilum* (*Phragmopedilum*), of the American tropics, which differs in having a 3-celled ovary and valvate æstivation; others are of the genus *Selenipedium*, very few species in trop. Amer., differing in habit, 3-celled ovary, lightly imbricate æstivation and convolute lf.-buds. Hybrids and variants in *Cordula* are numerous, many of them bearing regular binomial names mostly under the genus *Paphiopedilum* (which should now be restricted to plants of the western tropics).

Lvs. netted-veined or reticulated (tessellate).

Petals with warts or protuberances on upper and lower margins . . . 1. *C. Lawrenceana*

Petals with warts on upper margin only . . . 2. *C. barbata*

Lvs. not netted or reticulated.

Petals strongly undulate on margins . . . 3. *C. Spiceriana*

Petals flat or very nearly so on margins . . . 4. *C. insignis*

1. *C. Lawrenceana*, Rolfe (*Paphiopedilum Lawrenceanum*, Pfitz.). Lvs. tessellated, 8–10 in. long and 2–2½ in. broad, shorter than the pubescent scape: fls. 1 or 2, 4–5 in. across; dorsal sepal white with alternately longer and shorter purple veins, nearly orbicular; petals ligulate and ciliate, green with purple tips and 5–10 warts on each margin; lip dull purple, brownish above and green beneath. (Dedicated to Sir Trevor Lawrence, English orchidist.) Borneo; several vars. in cult.

2. *C. barbata*, Rolfe (*P. barbatum*, Pfitz.). Lvs. tessellated, 6 in. or less long, shorter than the pubescent scape: fls. 1 or 2, 2½–3 in. across, Feb. to June; dorsal sepal white and more or less purplish and with green at the base, veins prominent and purple, nearly orbicular, but pointed and folded at the middle; petals somewhat deflexed, oblong-linear and ciliate, apex purple, with small blackish warts on upper margin; lip helmet-shaped, brown-purple, the lobes infolded and deeply spotted. Malaya.—Many forms have this species as one parent, as *Cypripedium Harrisonianum* of florists: upper sepal almost blackish-purple with white margin; lower sepal pale green; petals brown-purple in upper half and buff-yellow in lower half; lip pale purple with deeper veins and reticulations; Jan. to Mar.

3. *C. Spiceriana*, Rolfe (*P. Spicerianum*, Pfitz.). Lvs. not netted or tessellated, 1 ft. or less long and 2 in. broad, broadly linear-lanceolate, pale beneath, about equaling the glabrous scape: fls. 1, about 3 in. across; dorsal sepal white with a crimson band down the center and green speckled basal blotch, the margins strongly reflexed; petals deflexed and somewhat falcate, oblong, undulate, pilose at base, green-brown; lip violet with green claw; staminode nearly orbicular. India, received by Mr. Spicer, England.

4. *C. insignis*, Raf. Lvs. not netted, very narrow, only ¾ in. broad and 1 ft. or so long, mostly longer than the densely pubescent scape: fls. 1 or rarely 2, 4–5 in. across, smooth and glossy, Nov. to Jan.; upper part of dorsal sepal white and lower part green with brown spots and stripes, broad-oval, margins somewhat revolute; petals nearly linear, spreading, undulate, yellow-green with purple veins; lip yellow-green shaded brown; staminodia obcordate. India.—Very variable, running into numerous color forms and with many hybrids. Var. *Sanderæ*, Hort., has lvs. and scape pale green; dorsal sepal primrose-yellow with very small reddish-brown dots, upper part white; petals yellow; lip waxy-yellow; Nov. to Jan. *Cypripedium Leea-num*, of florists, is *C. Spiceriana* × *C. insignis*, upper sepal white with green at base and with purplish spots; lower sepal pale green; petals greenish-yellow with purplish veins; lip yellowish-brown with deeper veins and buff-yellow on infolded lobes; Jan. to May.

2. **SOBRALIA**, Ruiz & Pav. About 30 orchids of trop. Amer., with reed-like leafy sts. and showy fls. with tubular lip.—Terrestrial: lvs. broad, strongly-veined, more or less plicate, sheathing at base, folded in the bud; fls. solitary or few in short terminal racemes, the parts all spreading; lip large and prominent, convolute around the column and with a large flat or expanding often undulate or fringed limb; pollinia 8. (*Sobralia*: Sobral was a Spanish botanist.)

*S. macrantha*, Lindl. Sts. tall and slender, to 6–7 ft., lf.-bearing to top: lvs. broad-lanceolate, taper-pointed, 6–10 in. long: fls. several, short-lived, 5–6 in. across, pink-purple, the large expanded undulate limb of lip deep purple, May to July; tube of lip long, whitish with yellow and ridges in the throat. Mex. and Guatemala.

3. **EPIDENDRUM**, L. Species probably 500, native from S. C. and Fla. through the American tropics, only very few in cult.—Epiphytic: sts. branching or sometimes represented by pseudobulbs: lvs. sometimes grass-like, but mostly short and fleshy: infl. terminal, spicate, racemose or sometimes paniculate; fls. variously colored, short-pedicelled; dorsal sepal usually broader or longer than the lateral ones; petals as broad as sepals or narrower, similar to them; lip with a distinct claw which is more or less adnate to the column, the limb expanded and usually deeply lobed; pollinia 4 to an anther, 2 in each cell. (Epidendrum: on trees, alluding to the habit.)

**E. vitellinum**, Lindl. Plant bearing pseudobulbs  $1\frac{1}{2}$ –2 in. long: lvs. 6–9 in. long, linear-lanceolate, glaucous-green: fls. 10–15, cinnabar-red,  $1\frac{1}{2}$  in. across, Oct. to Dec.; lip and column orange-yellow; sepals and petals broad-lanceolate, acute, the lip narrower and shorter.—Cult. in the form var. **majus**, Veitch, with shorter and thicker pseudobulbs, larger and more brilliantly colored fls. Mex., Guatemala.

4. **CATTLEYA**, Lindl. The most popular and showy of florist's orchids, all trop. American, about 40–50 species (or fewer if *C. labiata* is defined inclusively).—Epiphytes: sts. slender or club-shaped, often distinctly pseudobulbous: lvs. thick and stiff, with sunken midrib, 1–3 or in pairs at top of st.: fls. single or several, borne mostly at the apex of the st. or pseudobulb but sometimes on a leafy st. from the base of the pseudobulb, large and of brilliant colors; sepals and petals similar, or the petals much broader, the sepals free, spreading or rarely connivent; lip convolute or apparently tubular inclosing the column, 3-lobed, the middle lobe spreading and prominent; pollinia 4, in 2 pairs, each furnished with a tail. (Cattley-a; by usage Catt-leya: William Cattley, of Barnet, England, was an ardent collector and grower of rare plants; died 1832.)

- A. Pseudobulbs with 2–3 lvs.
  - B. Lip emarginate: autumn bloomer..... 1. *C. Bowringiana*
  - BB. Lip not emarginate, acute: spring bloomer..... 2. *C. Skinneri*
- AA. Pseudobulbs 1-leaved.
  - B. Lip narrower than lateral petals.
    - C. Blade of lip about as long as tube, its margin much crisped.
      - D. Throat of tube with golden eye or spot on either side..... 3. *C. labiata*
      - DD. Throat without eye.
        - E. Margin of blade (of lip) prominent, different in color from center.
          - F. Petals longer than sepals and lip..... 4. *C. Percivaliana*
          - FF. Petals about as long as sepals and lip..... 5. *C. Gaskelliana*
          - EE. Margin not evident, or wanting..... 6. *C. Warneri*
        - CC. Blade much shorter than tube, its margin little crisped..... 7. *C. Trianae*
    - BB. Lip about as broad as petals, or broader.
      - C. Blade with white border..... 8. *C. Mossiæ*
      - CC. Blade without white border.
        - D. Throat with yellow or white eye or spot on either side..... [ana
        - E. Tube same color as petals..... 9. *C. Luddemannii*
        - EE. Tube and limb of one color..... 10. *C. Warszewiczii*
        - DD. Throat without eye..... 11. *C. Mendellii*

1. **C. Bowringiana**, Veitch. Sts. or pseudobulbs club-shaped, about 1 ft. or more long, the 2 lvs. narrow-oblong, 6–8 in. long: fls. 5–12, small but highly colored, to 3 in. across, rose-purple; sepals oblong, acute, somewhat undulate; petals oval-oblong, obtuse, undulate; lip shorter than lateral sepals, front lobe emarginate, throat bearing a large white spot bordered maroon and purple, basal lobes convolute over column. (Dedicated to J. C. Bowring, England, ardent amateur of orchids.) British Honduras.

2. **C. Skinneri**, Lindl. Sts. or pseudobulbs 5–10 in. tall, club-shaped and much attenuate below, the 2 oval-oblong lvs. 6–8 in. long: fls. 5–10, about 4–5 in. across, bright rose-purple; sepals elliptic-lanceolate, acutish; petals oval-oblong, broader than sepals; lip with throat white bordered purple, the front lobe open and short-acute, the side lobes convolute over column. (Discovered by G. Ure Skinner in Guatemala in 1836.) Guatemala to Costa Rica.

3. **C. labiata**, Lindl. Well-known plant, introduced to cult. in 1818: sts. or pseudobulbs club-shaped, somewhat flattened, covered with greenish thin sheath

when young, becoming furrowed, 4–8 in. long, bearing 1 oblong obtuse thick durable lf.: fls. 2–5, about 6 in. across, rose-lilac, Oct., Nov., the peduncle arising from a double sheath; sepals lanceolate; petals much broader than sepals, ovate, undulate; lip ovate-oblong, obscurely 3-lobed, the front lobe large and emarginate, crisped on margin, magenta-purple bordered rosy-lilac, throat yellow with orange spot on either side, lateral lobes small, entire and convolute. Brazil; several forms in cult.

4. *C. Percivaliana*, O'Brien (*C. labiata* var. *Percivaliana*, Reichb. f.). Fls. smaller, 4–5 in. across, rosy-lilac suffused with amethyst-purple, Nov. to Feb., the petals usually deeper colored than sepals, the latter linear-lanceolate; lip rather small, shorter than petals and the tube of same color as petals, tinged yellow, the front lobe purple-crimson shaded maroon and the undulate border lilac, throat without eye-spots, yellow to orange and streaked purple. (Bears the name of R. P. Percival, England.) Venezuela.

5. *C. Gaskelliana*, Sander (*C. labiata* var. *Gaskelliana*, N. E. Br.). Fls. large, 6–7 in. across, amethyst-purple suffused white but sometimes darker in color, May to July; sepals lanceolate; petals oval and undulate, equaling sepals in length; lip about as long as sepals and petals, the tube of same color as petals, front lobe emarginate and crisped, purple-violet with paler border, throat tawny-yellow or orange and striped but without eye. (Named for Holbrook Gaskell, orchid cultivator near Liverpool.) Venezuela, Brazil.

6. *C. Warneri*, Moore (*C. labiata* var. *Warneri*, Veitch). Fls. large and open, 6–8 in. across, rose-colored shaded mauve or amethyst-purple; sepals lanceolate; petals oval; lip shorter than lateral sepals, tube the color of petals, the front lobe strongly crisped and emarginate, rich veined purple, the throat orange-yellow or tawny striped pale lilac or white, without eye-spots. (Bloomed in England in 1860 in collection of Robert Warner.) Brazil.

7. *C. Trianæ*, Lind. & Reichb. f. (*C. labiata* var. *Trianæ*, Duchatre). Fls. about 6 in. across, variable in color or tint (a white var.) but commonly delicate rose more or less shaded amethyst-purple, Dec. to Apr.; sepals oblong-lanceolate; petals much broader, oval-rhomboid, obtuse, crisped; lip very narrow and little spreading, the relatively long tube rose-color, the front lobe shorter than tube and not much crisped, throat yellow often streaked. (Bears the name of Dr. Triana, botanist of Bogota.) Colombia.—Var. *Schroederæ*, Hort. Fls. fragrant, uniform delicate blush suffused with white, petals much crisped, disk yellow; Mar. to May; dedicated to Baroness Schroeder.

8. *C. Mossiæ*, Hook. (*C. labiata* var. *Mossiæ*, Lindl.). Fls. very large, 6–8 in. or more across, rosy-lilac (varying to white), the sepals and petals of equal length, Apr. to June; sepals lanceolate; petals oval-elliptic, crisped especially on upper margin; lip large, equaling lateral petals in breadth, tube colored like the petals, the front limb large and much crisped, emarginate, center purple and variegated violet with white margin, throat yellow veined purplish. (First bloomed in England in the collection of Mrs. Moss, near Liverpool.) Venezuela; variable.

9. *C. Luddemanniana*, Reichb. f. (*C. labiata* var. *Luddemanniana*, Reichb. f.). Fls. medium in size, 5–6 in. across, delicate purplish-rose suffused white (running to white var.); sepals oblong, acute; petals elliptic, somewhat undulate, nearly three times as broad as sepals; lip broad, the tube same color as petals, front lobe crisped and emarginate and amethyst-purple, the throat with 2 yellow or white blotches between which are radiating lines of amethyst-purple. (Bloomed middle of last century in the collection of M. Pescatore near Paris, Luddemann, gardener.) Venezuela.

10. *C. Warscewiczii*, Reichb. f. (*C. labiata* var. *Warscewiczii*, Reichb. f.). Fls. very large, 7–9 in. across, rose-mauve, July, Aug.; sepals lanceolate, acute; petals oval, obtuse, undulate; lip somewhat fiddle-shaped, entirely bright crimson-purple except 2 yellow spots in throat with lines of same color, the front lobe large, crisped with deep notch at end. Colombia; first collected about 1848 or 1849 by J. Von Warscewicz.—Var. *gigas*, Hort. (var. *Sanderiana*, Hort.). Fls. very large; sepals and petals dark rose with deep purple-magenta lip.

11. *C. Mendeli*, Backh. (*C. labiata* var. *Mendeli*, Reichb. f.). Fls. very large, 7–8 in. across, white or tinted mauve, May to July; sepals oblong-lanceolate; petals obliquely oval, obtuse, notched and crisped; tube of lip white or colored like petals, front lobe broad and spreading and much crisped and indented, rich crimson-purple, throat yellow without eye but reddish-streaked. (Named in compliment to Sam Mendel, near Manchester, England.) Colombia.

5. **LÆLIA**, Lindl. About 30 species in trop. Amer., differing from *Cattleya* in the presence of 8 pollinia: other features more or less distinguish the genus from *Cattleya* although not constant, as short ovoid or pyriform pseudobulbs and by long slender peduncles often with fls. clustered at the end. (*Lælia*: probably an historic personal name.)—*Lælia* and *Cattleya* hybridize freely, the crosses constituting the group *Læliocattleya*, Rolfe. Many species-forms are named in this group. The plants are irregular in their pollinia.

Pseudobulbs short, scattered on the rhizome, rounded, pyriform or ovate. 1. *L. anceps*  
Pseudobulbs long, forming sts., long-oblong, club-shaped or spindle-shaped.

Fls. purple, rose, or white.....2. *L. purpurata*  
Fls. with sepals and petals tawny-yellow.....3. *L. grandis*  
Fls. greenish-yellow or greenish-purple, lip cream.....4. *L. Digbyana*

1. **L. anceps**, Lindl. Pseudobulbs ovate-oblong and compressed, scattered on the rhizome: lvs. 6-8 or 9 in. long, oblong-lanceolate, stiff: scape or peduncle from top of pseudobulb,  $1\frac{1}{2}$ -3 ft. long, jointed and bracted, bearing 2-5 (seldom 1) showy pale rose-purple fls. about 4 in. across, Nov. to Jan.; sepals lance-acuminate; petals ovate-acuminate, broader than sepals; lip 3-lobed, the 2 lateral lobes folded over column and yellowish inside, front lobe oblong and sharply short-pointed, more or less reflexed, deep purple with white on the disk and a yellow keel. Mex.; many vars. in cult.

2. **L. purpurata**, Lindl. & Paxt. Robust: sts. or pseudobulbs 6-8 in. tall, long-elliptic, sheathed when young, furrowed when old, bearing 1 oblong dark green leathery lf. 1 ft. or so long: fls. 3-7 or more, very large, 6-8 in. across, white suffused light rose or amethyst-purple, May to June; sepals linear-oblong; petals ovate, much broader, undulate; lip very large, bell-shaped or rhomboidal when flattened out, somewhat 3-lobed, the front lobe rounded and crisped, spreading, rich purple with darker veins, yellow in the throat. Brazil.

3. **L. grandis**, Lindl. & Paxt. Sts. or pseudobulbs compressed, slender below, bearing 1 oblong-lanceolate stiff lf. 8-10 in. long: fls. 2-5, medium size, 4-5 in. across, the sepals and petals tawny-yellow and lip whitish with purple veins, appearing in spring; sepals lanceolate or elliptic-lanceolate, undulate and twisted; petals ovate; lip 3-lobed, the front lobe large and crenate-toothed. Brazil.—Var. **tenebrosa**, God., has sepals and petals citron-yellow and less undulate; lip with a broad band of white.

4. **L. Digbyana**, Benth. Sts. or pseudobulbs club-shaped, compressed, with 1 linear or elliptic fleshy stiff glaucous lf. 5-8 in. long: fl. 1 to a peduncle, large, 4-5 in. across, fragrant, yellow-green, rose, and white, July, Aug.; sepals and petals oblong and spreading, pale yellow-green or the petals sometimes tinged purplish; lip very large, entirely inclosing the column, fringed, cream-colored. (Bloomed in England in 1847 by St. Vincent Digby, Dorsetshire.) Honduras.

6. **SOPHRONITIS**, Lindl. About a half-dozen Brazilian orchids, one of which is well known under glass.—Small epiphytes, differing from *Cattleya*, among other things, by the 8 pollinia and from *Lælia* in the erect anther and projecting points of stigma rather than a stigmatic depression: pseudobulbs small and clustered on the rhizome each with a single stiff lf.: fl. usually 1, borne from top of pseudobulbs, bright-colored; sepals and petals spreading, nearly equal; lip with broad middle lobe and small erect side lobes, the base of the lip leading to a cavity in wall of ovary. (*Sophroni-tis*: Greek *modest*, alluding to the pretty fls.)

**S. grandiflora**, Lindl. Pseudobulbs about 1 in. long, clustered: lvs. elliptic, 2-3 in. long: fl. 1, about  $1\frac{1}{2}$ -2 in. across, sometimes more, brilliant scarlet with base and sides of lip orange-yellow streaked scarlet, in winter; lip narrow, with folded lobes. Organ Mts. of Brazil.

7. **CÆLOGYNE**, Lindl. More than 100 species of epiphytic orchids of the eastern hemisphere, mostly of the Indo-Malayan region; many are grown by fanciers, but only one is generally known.—Pseudobulbs tufted on the rhizome or borne at intervals on the st.: lvs. usually 2 to each pseudobulb: fls. in racemes, often many, medium or large, with similar spreading or reflexed sepals and



petals; lip 3-lobed and sessile at base of column, the side lobes erect, the front one spreading or recurved and keeled; column winged on both sides and inclosed by side lobes of lip; pollinia 4. (Cælog-yne: Greek combination referring to the *hollow* or *depressed stigma*.)

**C. cristata**, Lindl. Handsome plant bearing many drooping racemes of white fls. with orange-yellow throat, Jan. to Mar.; sepals and petals lance-oblong, acute, undulate; lip oval, 3-lobed, the side lobes slightly incurved, the front lobe denticulate. Trop. Himalaya; grown in several forms.

8. **VANILLA**, Juss. About 50 root-climbing branching herbs, in tropics around the world, one of them yielding the natural vanilla of commerce.—Lvs. various, thick or papery; fls. large but not showy, in mostly short axillary racemes or spikes, with ovate bracts; sepals nearly or quite alike, free and spreading, and petals similar to them; lip with claw attached to the footless column, the blade broad and concave and enveloping the long wingless column: caps. usually long and fleshy, bean-like in shape, little or not at all dehiscing. (Vanil-la: the Spanish name for the fr.—*little sheath* or *pod*—recorded by Linnæus as *Epidendrum Vanilla*.)

**V. planifolia**, Andr. COMMON VANILLA. St. leafy and somewhat fleshy, tall-climbing: lvs. thick, oblong, acute or acuminate, 6–8 in. long, 2 in. or more broad, parallel nerves obscure, but becoming prominent when dried: fls. many in the raceme, greenish-yellow, about 2 in. long; sepals and petals narrowly oblanceolate; lip narrow, trumpet-shaped, shorter than other parts, with small crenulate lobes. Mex. and Cent. Amer.; planted in warm and trop. countries for the pod, which yields vanilla extract.—Other species yield similar products. The striped-leaved vanilla sometimes grown under glass for ornament, as *V. aromatica variegata*, is presumably this species.

9. **ODONTOGLOSSUM**, HBK. About 100 species in the warm and higher parts of the American trop. region, yielding favorites for glasshouse culture.—Epiphytic: rhizomes short, bearing short and broad 1-leaved pseudobulbs: fls. odd and showy, few or many in slender racemes or panicles from the base of the pseudobulbs; sepals and petals mostly similar or the latter sometimes broader, spreading, free or very nearly so; lip with large spreading variously shaped middle lobe that bears a fleshy crest near the base and small often erect lateral lobes, the base parallel to the club-shaped often elongate column and sometimes adnate to it; pollinia 2, pear-shaped or ovoid. (Odontoglossum: Greek *tooth-tongue*, because of the crests or teeth on lip.)

Petals toothed and crisped.....1. *O. pendulum*  
Petals entire.

Fls. white to rose.....2. *O. citrosimum*  
Fls. yellow, barred brown.....3. *O. grande*

1. **O. pendulum**, Batem. (*O. crispum*, Lindl.). Showy, floriferous and very variable species: pseudobulbs ovate, compressed, about 3 in. long, bearing at top 2 linear-lanceolate pointed lvs. about 1 ft. long; fls. many in panicle 2 ft. or more long, 2–3½ in. across, white variously spotted crimson or brown, sometimes tinged rose or even yellow, Mar. to May; sepals ovate to ovate-lanceolate, often undulate; petals ovate to rhomboid, toothed and crisped; lip longer than broad, fringed and undulate, bright yellow in throat; column with jagged wings. Colombia.

2. **O. citrosimum**, Lindl. Pseudobulbs ovoid or nearly globular, compressed, 4–6 in. long, bearing 1 or 2 oblong obtuse lvs. 1 ft. or less long: fls. a dozen more or less, large, 3 in. across, white to rose with violet or deep rose lip, May, June; sepals and petals similar, oval, entire; lip with a reniform clawed emarginate blade; column with 1 dorsal and 2 lateral wings. Mex., Guatemala.

3. **O. grande**, Lindl. BABY ORCHID. Pseudobulbs ovoid and compressed, 3–4 in. long, light green, bearing 2–3 oval-oblong or broad-lanceolate lvs. 4–5 in. long: fls. few on erect stout peduncles, very large, 5–6 in. across, yellow barred cinnamon-brown, lip pale yellow or whitish, in autumn; sepals lanceolate, lateral ones keeled; petals broader, somewhat undulate but entire; lip nearly orbicular, usually banded and spotted; column with small auricles, downy. Guatemala.

10. **MILTONIA**, Lindl. Twenty or more S. American species of great beauty.—Closely allied to *Odontoglossum*, from which it is separated by its short narrow-winged or wingless column to the base of which the sessile not 3-lobed lip is adnate and from which the lip spreads at nearly or quite a right angle; from *Oncidium* it is distinguished by the unswollen column, and the sessile practically entire crestless lip. Epiphytic: pseudobulbs short, bearing 1 or 2 lvs. at top and others at base: fls. 1, several or many, on a peduncle arising from base of pseudobulbs; sepals nearly equal and spreading, free or somewhat united; petals similar, sometimes broader; lip large, without distinct claw, expanded and not lobed but sometimes bifid. (*Miltonia*: dedicated to Viscount Milton, patron of hort. and natural science.)

Fls. white.....1. *M. Roezlii*  
Fls. rose.....2. *M. vexillaria*

1. **M. Roezlii**, Nichols. Pseudobulbs ovate-oblong, about 2 in. long, each bearing 1 linear pale green lf. 1 ft. or less long: fls. 2-3 on scapes about half as long as lvs., 3-4 in. across and opening flat, white with purple blotch or band at base of each petal and orange-yellow or brownish at base of lip (a pure white var.), blooming usually twice a year, in spring and winter; sepals and petals ovate-oblong and acute. lip large, obcordate, bearing a small horn-like spur on each side near base; column wingless. Colombia; first collected in 1873 by Benedict Roezl.

2. **M. vexillaria**, Nichols. Very like above, but lvs. broader, fls. larger, sepals and petals obovate and not acute or only apiculate, lip more deeply bifid, light or dark rose, the parts sometimes white-margined, lip more or less streaked yellow and red, Apr. to June. Colombia, Ecuador.

11. **ONCIDIUM**, Sw. Orchids of the western hemisphere, more than 300 species, many grown by fanciers, one or two generally known.—Epiphytic plants characterized technically by the short winged column that is tumid or swollen below the top, and 3-lobed lip that is crested, cushioned or tuberculate at base: pseudobulbs usually present, 1-2-leaved: lvs. plane, terete or angled; sepals nearly or quite equal, spreading or reflexed, the 2 lateral sometimes partially united; petals similar to dorsal sepal or larger; lip various, but never with its base parallel to the column as in *Odontoglossum*, spreading nearly at right angles to the column. (*Oncidium*: from the Greek for *swelling* or *tubercle*, alluding to the crest of lip.)

**O. varicosum**, Lindl. Pseudobulbs 2-4 in. long, ovate and angled: lvs. stiff and very narrow, almost linear, 6-9 in. long: infl. nodding, branched, 3-5 ft. long, bearing many green-and-yellow fls. about 1 in. across; sepals and petals small, green with brownish blotches; lip very large and comprising most of the bloom, bright yellow, with a toothed crest and sometimes a red-brown blotch. Brazil.—Var. **Rogersii**, Reichb. f., has much larger blade 2 in. or more across and more spreading, rich yellow with red bars: exhibited in 1868 by Dr. Rogers before Royal Horticultural Society. Oct. to Dec.

12. **CYMBIDIUM**, Sw. Probably 50 species of the Old World tropics and warm regions, mostly of farther Asia and Malaya.—Mostly epiphytic, usually with pseudobulbs: lvs. long for the most part, narrow, persistent: infl. on a loosely sheathed peduncle, nearly erect or drooping, the fls. few to many and usually large and showy; sepals and petals similar and nearly equal, spreading or erect, free; lip sessile at base of column and jointed to it, usually 3-lobed, the side lobes erect and front lobe recurved, concave at base, the disk or throat with 2 prominent ridges; column long, erect, footless; pollinia 2. (*Cymbidium*: Greek *boat*, from shape of the lip.)

**C. Lowianum**, Reichb. f. Pseudobulbs oblong, compressed, 4-6 in. long: lvs. very narrow, acute, 2-3 ft. long, recurved: fls. usually 20 or more in strong arching racemes, 3-4 in. across, yellowish and brown; sepals and petals oblong-lanceolate, acute, greenish-yellow with brownish or reddish veins; side lobes of lip roundish-oblong, light buff-yellow; front lobe slightly undulate, reflexed, pubescent, purple-

maroon with yellow margin. Burma; received in England in 1877 by Messrs. Low, nurserymen.—*C. Gottianum*, Sander, is a hybrid. Fls. white, sepals with greenish tinge, lip blotched ruby-purple; Mar. to May.

13. **DENDROBIUM**, Sw. Orchids of the eastern tropics, mostly of the Malayan region, of 600 species and many hybrids, popular among collectors.—Epiphytic: st. system various; parts sometimes short and pseudobulbous, but mostly elongated and articulated, tufted or springing at intervals from the rhizome, often thickened at or near the base, sometimes leafless at flowering time: lvs. various, usually short and fleshy, deciduous or evergreen, not strap-shaped or plicate: fls. showy in the cult. species, in terminal or lateral long or short racemes, sometimes only 1 or 2, of many forms and colors; sepals of nearly equal length, the 2 lateral adnate to foot of column and forming a sac-like or spur-like body; petals much like dorsal sepal, either broader or narrower; lip jointed to base of column, 3-lobed or entire; pollinia 4. (*Dendrobium*: Greek compound, *tree* and *life*, from the epiphytic habit.)

- Lf.-sheaths black-hairy when young.....1. *D. formosum*  
 Lf.-sheaths not so.  
 Fls. few, usually in pairs (or more in No. 2).  
   Sepals and petals yellow.....2. *D. pulchellum*  
   Sepals and petals otherwise.  
     Throat yellow with 2 purple spots.....3. *D. Wardianum*  
     Throat deep purple.....4. *D. nobile*  
 Fls. 3–many in racemes.  
   Color of fls. purple or red, at least the lip.....5. *D. Phalænopsis*  
   Color of fls. white or yellow.  
     Sepals and petals yellow.....6. *D. densiflorum*  
     Sepals and petals white.....7. *D. thysiflorum*

1. *D. formosum*, Roxb. Sts. 12–18 in. high, cylindric, about as thick as little finger, leafy, bearing blackish hairs when young: lvs. ovate-oblong, about 5 in. long, clasping: fls. in racemes or fascicles of 3–5 in upper axils, white with yellow mark on lip, 3–4 in. across; sepals oblong-elliptic, about half as broad as petals; lip ovate-oblong, retuse, the front margin jagged. India.—Var. *giganteum*, Van Houtte, has fls. 4–5 in. across; Dec.

2. *D. pulchellum*, Roxb. (*D. Dalhousieanum*, Wall.). Sts. 2–4 ft. long, cylindric, size of little finger, spotted purple when young: fls. often 6–10 or more in a pendulous raceme, 4–5 in. across, pale yellow tinted and veined rose with large purple blotch on either side lip near base, May, June; sepals ovate-lanceolate, much narrower than petals, 2 lateral ones falcate; lip oval and concave, obscurely 3-lobed, hairy on front. India.

3. *D. Wardianum*, Warner. Sts. 2–3 ft., pendulous, cylindric, as thick as little finger or less: fls. in 2's and 3's, about 3–4 in. across, white tipped amethyst-purple with yellow throat in lip and a maroon spot on either side, Feb. to Apr.; sepals oblong, about half as wide as the oval petals; lip nearly orbicular. (Dedicated to Dr. Ward, cultivator, England.) India.

4. *D. nobile*, Lindl. One of the best-known species in many color vars.: sts. tufted, 1–2 ft., nearly cylindric: lvs. ovate-lanceolate, 3–4 in. long, persistent 2 years: fls. in 2's or 3's, about 2–3 in. across, waxy-white with amethyst-purple tips or over-color and maroon-purple disk bordered yellowish white and purple spot at tip of lip (the colors and markings variable), Mar., Apr.; sepals oblong, obtuse; petals broader, oval and undulate; lip with nearly orbicular blade, downy on both surfaces. India and eastward.

5. *D. Phalænopsis*, Fitzg. Sts. 1–2 ft., about as thick as little finger, leafy above: peduncle terminal or nearly so and slender, bearing 8–15 fls. white, rose, and purple, 2½–3½ in. across, Oct., Nov.; sepals lanceolate, acute, white flushed rose; petals rhomboid, mauve, veined; lip 3-lobed, the lateral lobes curved over column and maroon-purple, the front lobe oblong, maroon-purple at base and lighter above. Australia and Isls., named for its resemblance to *Phalænopsis*.

6. *D. densiflorum*, Wall. Sts. club-shaped, 1–1½ ft. long, 4-angled, leafy: racemes many-fl'd., pendulous, 7–9 in. long, with orange-yellow fls. about 2 in. across and which are nearly transparent in texture, Mar., Apr.; sepals oblong-ovate, acute; petals nearly orbicular, clawed, the margin denticulate; lip nearly orbicular, clawed, downy above, blade fimbriate. India.

7. *D. thyrsiflorum*, Reichb. f. Very like No. 6 and by some considered a form of it: differs in sepals and petals white; sts. terete, longer and more slender; May, June. India.

14. **RENANTHERA**, Lour. Perhaps a score of species in the Malay Archipelago and Cochin-China, one of which is fairly well known in cult. in this country.—Epiphytic leafy-stemmed diffuse or climbing plants without pseudobulbs, and distichous spreading stiff or fleshy lvs.: fls. in long drooping racemes or panicles, showy in the cult. kinds, mostly red; sepals and petals spreading, the parts similar or the lateral sepals sometimes larger and differently colored; lip small and movably jointed to the column, with or without spur, often with small erect lateral lobes; pollinia 2. (*Renanthe-ra: reniform anther* or pollinia of the original species.)

**R. Imschootiana**, Rolfe. Dwarf: sts. about 1 ft. long: lvs. linear-oblong, 2–4 in. long and 1 in. broad: fls. red and yellow, about 2 in. across, in a panicle with bright red branches, Feb. to Apr.; dorsal sepal linear-oblong, obtuse, dull yellow; lateral sepals twice longer, oval and clawed, cinnabar-red above and ochre-yellow beneath; petals narrow-spatulate, a little shorter than dorsal sepal, yellow spotted blood-red; lip very small, 3-lobed; column scarlet. (Dedicated to A. Van Imschoot, Ghent.) India (Assam).

15. **PHALÆNOPSIS**, Blume. About 50 species of trop. Asia, Philippines, and Malaya, yielding some of the best hothouse orchids.—Epiphytic, with leafy sts. and no pseudobulbs: lvs. few, oblong, thick and leathery, often mottled: fls. mostly white or whitish with over-colors of rose or purple, attractive in form and color, in drooping panicles; sepals wide-spreading, nearly equal, the lateral ones more or less adnate to base of column; petals equaling or much exceeding sepals; lip united immovably with base of column, various in shape, spurless, sometimes with marked or odd appendages at apex; column straight or slightly curved, with short foot; pollinia 2. (*Phalænop-sis: Greek moth-like.*)

|  |                           |
|--|---------------------------|
| Appendages at front of lip tendril-like..... | 1. <i>P. amabilis</i>     |
| Appendages short and horn-like.....          |                           |
| Fls. white, with red and yellow spots.....   | 2. <i>P. Stuartiana</i>   |
| Fls. rose-purple.....                        | 3. <i>P. Schilleriana</i> |

1. **P. amabilis**, Blume. One of the favorite orchids: lvs. pale green, broadly obovate-oblong, 6 in. to 1 ft. or more long: fls. in an ascending or arched panicle, 3–5 in. across, flat white with stains of deep yellow and few purple spots on lip and column, mostly in autumn; dorsal sepal elliptic-oblong; lateral sepals lance-oblong; petals broad, more or less rhomboid, contracted at base; lip 3-lobed, the lateral ones rounded and incurved, the middle or front one very narrow and with 2 yellow tendril-like appendages. Philippines and Malay Archipelago.—**P. Aphrodite**, Reichb. f., has a broader trowel-shaped middle lobe of lip, fls. mostly smaller, the lip streaked and spotted yellow and red; lvs. deeper glossy green, purplish beneath. **P. Sanderiana**, Reichb. f., has fls. suffused with rose, the lip variegated with brown-purple and yellow; Dec. to Mar. These, and others, are undoubtedly botanical forms of *P. amabilis*: *P. amabilis* var. *Aphrodite*, Ames, and subvar. *Sanderiana*, Ames (*P. Aphrodite* var. *Sanderiana*, Rolfe). *Aphrodite* is the Greek name of Venus, applied here because of the beauty of the fls.; and var. *Sanderiana* bears the name of Messrs. Sander, the nurserymen of Belgium and England.

2. **P. Stuartiana**, Reichb. f. Lvs. elliptic-oblong, obtuse, about 1 ft. long, mottled when young: fls. in a branched drooping panicle, 2 in. across, white or nearly so, Nov. to Jan.; sepals elliptic, obtuse, the lateral ones speckled red; petals angled, rounded, white with few purple dots at base; lip 3-lobed, yellow or orange at base, spotted crimson, middle lobe orbicular with 2 anchor-like appendages at apex. (Bears the name of Stuart Low, nurseryman, England.) Philippines.

3. **P. Schilleriana**, Reichb. f. Lvs. oblong, to 1½ ft., mottled gray above and purple beneath: fls. in a drooping flat panicle often 3 ft. long and broad, the fls. 2½–3 in. across, rose-purple, Dec. to Mar.; dorsal sepal obovate and acute; lateral sepals ovate; petals large, rhomboid; lip often paler than other parts, sometimes spotted red-brown and with 2 incurved appendages. (Bloomed in 1860 in the collection of Consul Schiller, Hamburg, Germany.) Philippines.



16. **AËRIDES**, Lour. About 30 species, India to Japan and Malay Archipelago, one well known under glass.—Epiphytic, with leafy sheathed sts. and no pseudobulbs: lvs. distichous, stiff and somewhat fleshy: fls. in simple or compound lateral clusters, medium or rather large, mostly white with rose or purple spots or over-tints; sepals spreading, 2 lateral about equal and attached to foot of column, dorsal broader; petals much like the dorsal sepal; lip attached to foot of column, with a hollow spur usually upturned, 3-lobed, the lateral lobes erect, the middle one spreading; pollinia 2. (Aëri-des:  $\Delta$  Greek signifying "children of the air," i.e. *air-plant*.)

**A. odoratum**, Lour. St. erect or ascending, with many strap-shaped horizontal or arching lvs. 6-8 in. long standing off from either side: axillary racemes equaling or exceeding lvs., with many fragrant white fls. more or less tinged and spotted, about 1 in. long; sepals oval-oblong, the dorsal narrower and petals still narrower, all with purple spot at obtuse apex; lip funnel-shaped, sometimes purple-tinged or spotted, middle lobe linear-oblong with a purple line in center. India to Cochinchina.

17. **VANDA**, R. Br. Species about 25, India and eastward, Malaya to New Guinea, yielding a few popular glasshouse plants.—Epiphytic, with short or long sometimes climbing leafy sts., not pseudobulbous: lvs. distichous, spreading, stiff or somewhat fleshy, often emarginate at apex, flat, keeled or terete: fls. in simple axillary racemes, short-pedicelled, often showy, in several colors; sepals and petals similar, narrowed at base spreading; lip immovably united to base of footless column, spurred or saccate, lateral lobes small, middle lobe spreading and various in form with fleshy disk and usually ridged; pollinia 4. (Van-da: Sanscrit name.)

Fls. blue.....1. *V. cærulea*  
Fls. yellow or white and spotted, with purple lip.....2. *V. tricolor*

1. **V. cærulea**, Griff. Beautiful species, with st. 1-2 ft. tall: lvs. leathery, linear, 5-10 in. long and 1 in. or less broad, toothed at tip: fls. pale blue, 3-4 in. across, several to many in a raceme 1-2 ft. long, Oct. to Dec.; sepals and petals oval or obovate, much narrowed at base, faintly tessellated; lip less than one-third length of sepals, oblong, 3-lobed, the side lobes with incurved point and middle lobe with 2 thickened ridges. India.

2. **V. tricolor**, Lindl. St. tall and branched: lvs. strap-shaped, about 1 ft. long and  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. broad, unequally 2-lobed at apex: fls. yellow with red-brown spots on sepals and petals and purple lip, 2-3 in. across, fragrant, several on ascending or spreading raceme; sepals and petals similar in shape and color but petals narrower, obovate-oblong to obovate-orbicular, clawed, thick, undulate; lip about as long as sepals with small rounded side lobes and lyrate notched middle lobe. Java.—Var. *suavis*, Veitch (*V. suavis*, Lindl.). Fls. more numerous; sepals and petals white with fewer spots red-purple; middle lobe of lip deep purple in lower half; Mar. to May.

18. **CALANTHE**, R. Br. About a half-hundred species in tropics of eastern and western hemispheres, mostly the former; one is commonly cult.—Terrestrial or epiphytic, sometimes pseudobulbous, with few plicate rather large petiolate lvs.: scapes erect or nodding, simple, loosely or densely many-flid.; fls. white, rose-colored or yellow; sepals nearly equal, free, mostly widely spreading; petals similar to sepals or narrower; lip with claw that is connate with column forming a tube or a broad turbinate cavity, mostly spurred at base, the blade spreading and 3-lobed, the middle lobe usually emarginate or 2-lobed; column short and erect, footless; pollinia 8, 4 in each cell. (Calan-the: Greek *beautiful flower*.)

**C. vestita**, Lindl. A beautiful and popular plant with broad-lanceolate lvs.  $1\frac{1}{2}$ -2 ft. long appearing after the bloom from angled grayish pseudobulbs 3-5 in. long: fls. 2-3 in. across, milk-white with yellow blotch on lip, numerous in a long very hairy raceme, with conspicuous bracts, Dec., Jan.; sepals oval-oblong and apiculate; petals obovate-oblong, obtuse; lip flat and 3-lobed, large. Malaya.—

There are many forms. *C. Veitchii*, Lindl., is a hybrid with rose-colored fls., the lip with white spot; *C. vestita* is one of the parents.

19. **LYCASTE**, Lindl. One popular cult. orchid, and about 30 others, all native in trop. Amer.—Epiphytic and terrestrial, with ovate or oblong-ovate pseudobulbs bearing 1-several plicate lvs. at summit and sheathing lvs. from base: peduncle 1-2- or 3-fl'd., rising from base of pseudobulb; sepals nearly equal, spreading, lateral ones united with foot of column; petals smaller, standing forward, the tips often recurved; lip jointed to foot of column, 3-lobed, the side lobes erect, middle lobe ascending or reflexed and with a tongue-like callus lengthwise on disk; pollinia 4. (*Lycas-te*: name in Greek mythology.)

**L. Skinneri**, Lindl. Pseudobulbs 3 5 in. high, oblong-ovate, 1 3-leaved: lvs. oblong-lanceolate, 9-18 in. or more long, much exceeding the single-fl'd. scape: fl. waxy, rose-and-white (a white var.), 5-6 in. across, Oct. to Dec.; sepals ovate-oblong, white tinged rose; petals similar in shape but much shorter, more deeply colored; lip ovate, 3-lobed, mostly deep crimson-purple and variously spotted, the middle lobe recurved and with a fleshy tongue-shaped callus. Guatemala; collected there by G. Ure Skinner and sent to England in 1841.

20. **ZYGOPETALUM**, Hook. Probably a dozen species as the genus is now limited, in trop. Amer., one frequent under glass.—Mostly epiphytic and usually pseudobulbous: lvs. many, distichous, sheathing, rather thin, plicate or very veiny: fls. mostly showy, solitary or in racemes, vari-colored; sepals and petals much alike and usually united at base, the lateral sepals jointed to foot of column; lip 3-lobed but the side lobes small, the middle lobe broad and flat, spreading or at apex recurved, with a prominent transverse crest on disk; pollinia 4. (*Zygopet-alum*: Greek *yoked* or *joined petals*.)

**Z. Mackaii**, Hook. Pseudobulbs ovoid, 2-3 in. long, with 2-3 linear-lanceolate lvs. 1 ft. long: scape 18 in. and more long, bearing 5-8 separated fls. 3 in. across up and down, yellow-green and white, spotted and marked purplish-brown; sepals and petals oblong, acute, united at base, blotched purplish or yellow-green; lip large, rounded or fan-shaped, emarginate, white with streaks and spots of blue-purple. Brazil, introduced into Botanic Garden at Dublin by Mr. Mackay.

21. **PHAIUS**, Lour. Species about a score, in trop. Asia and Pacific Isls., one frequent under glass.—Large plants, terrestrial or epiphytic, with clustered sts. terminating in racemes, usually pseudobulbous at base: scape tall, leafless but sheathed, bearing several to many yellow to brown, sometimes white or rose, fls.; sepals and petals similar, spreading or partially so, free; lip free from the wingless column but the lateral lobes inclosing it, swollen or spurred behind; pollinia 8. (*Phai-us*: *dark* or *swarthy*, Greek, from color of fls. of the original species.)

**P. grandifolius**, Lour. Long in cult.: pseudobulbs roundish or ovate, thick, sheathed: lvs. 4-6, oblong-lanceolate, 2-3 ft. and more long, dark green, plaited, acute: scape 3-4 ft. high, bearing a 12-18-fl'd. raceme: fls. 3-4 in. across, yellow-brown inside and silvery-white outside with yellow-brown bordered purple lip; sepals and petals oblong-lanceolate, acute, nerved; lip broadly obovate, convolute most of its length, with a yellow streaked purple disk. China, Australia.

22. **STANHOPEA**, Frost. Probably 50 species, in trop. Amer., one or two more or less frequent in cult.—Epiphytic, with many pseudobulbs clustered on the short rhizome and sheathed with scales: lvs. 1 to each pseudobulb, petioled, plaited, usually large: scape simple, deflexed or pendulous, bearing 2-3 or sometimes more large and fragrant pedicellate mostly white, yellow, tawny or reddish purple-spotted fls.; sepals and petals spreading or reflexed, thin, soon fading; dorsal sepal of medium size, the lateral sepals mostly larger and the petals mostly smaller; lip attached to the winged column and continuous with it, remarkably formed, in 3 parts:—lower part (hypochil) boat-

shaped or saccate, often with 2 horns on upper margin; middle part (mesochil) fleshy with 2 lateral horns; terminal part (epichil) usually fleshy and keeled; pollinia 2. (Stanhoepa: named in compliment to Earl Stanhope.)

Sepals broadly ovate and obtuse.....1. *S. tigrina*  
 Sepals oblong or narrower, acute.....2. *S. Wardii*

1. *S. tigrina*, Batem. Fls. 3-4 to a scape, 6-7 in. across, waxy and fragrant, red-yellow-and-white; sepals broadly ovate, concave, obtuse, red with yellow spots and mottles, in summer; petals oblong-lanceolate or linear-oblong, margins revolute, red and yellow; lip broad-oval, the hypochil orange-yellow blotched maroon-purple, the mesochil white spotted purple, the epichil 3-toothed and white spotted purple. Mex.

2. *S. Wardii*, Lodd. Fls. 5-7 to a scape, yellow to orange with red or red-purple spots; sepals oblong and acute; petals much narrower, acute, revolute; hypochil variously orange-yellow and purple-spotted, the cavity dark velvety purple; mesochil yellow or white; epichil pale yellow spotted red. Mex. to Venezuela; first sent from the latter country to Loddiges by Mr. Ward, 1828.

### 34. CASUARINACEÆ. CASUARINA FAMILY

About 25 odd trees of Australia and the Pacific Isls., a few of which are commonly planted in our southern regions and in Calif.—Branchlets very slender and equisetum-like, usually jointed, striate, more or less deciduous, the lvs. represented by whorls of minute scales, foliage lvs. wanting; monœcious or diœcious; staminate fls. in slender spikes terminating the green or gray branchlets (which are sometimes taken for rush-like lvs.), and sometimes lateral, consisting of 1 stamen attended by 2 scales and with 1 or 2 perianth scales, the anthers large and conspicuous; pistillate fls. in short dense heads in the axils along the axis, without perianth, consisting of 1 pistil with 1-celled 2-ovuled ovary, the head or spike becoming a dry cone-like or ball-like body: fr. a thin winged nutlet, held between 2 hard persistent bractlets that open at maturity like the valves of a caps.

**CASUARINA**, L. The only genus, with characters of the family. (Casuari-na: probably *Casuarinus*-like, from the resemblance of the branches to feathers of the cassowary.)—The casuarinas are called oaks in Australia from a fancied resemblance in the wood. The species in cult. in N. Amer. are not well understood or distinguished.

Bractlet-valves (of fruiting cone) not keeled on back: whorls with 6-8 lf.-scales (usually 7).

Cones about  $\frac{1}{4}$  in. diam.: valves pubescent on back.....1. *C. equisetifolia*

Cones about  $\frac{1}{2}$  in. diam.: valves not pubescent.....2. *C. Cunninghamiana*

Bractlet-valves keeled on back: whorls with 9-16 lf.-scales (usually 10-12).....3. *C. stricta*

1. *C. equisetifolia*, L. BEEFWOOD (from the color). Narrow very tall tree 50-70 ft. and more, with rush-like scant branch-foliage moving widely in the wind, the branches drooping, producing hard wood, growing well in sand and by the sea: branches grayish-green, wire-like, with internodes about  $\frac{1}{4}$  in. long, the short-acute or fine-pointed teeth about 7 in each whorl, suggesting twigs of equisetum (whence the name *equisetifolia*): male spikes about  $\frac{3}{4}$  in. long, with imbricating lf.-whorls: cones very short-stalked, globular, about  $\frac{1}{2}$  in. diam., the broad-ovate obtuse bractlet-valves pubescent outside. N. Australia and Queensland and elsewhere; widely naturalized.—Known also as Australian Pine, South-Sea Ironwood, She-Oak, Horsetail-Tree, Mile-Tree (from the height); much planted in the semitrop. parts and farther south; naturalized in Fla.

2. *C. Cunninghamiana*, Miq. Branchlets fine: cones very small,  $\frac{1}{3}$  in. or less diam., globular, the valves glabrous: lf.-whorls of male spikes not imbricated: otherwise much like No. 1. (Named after A. Cunningham, early collector of the species.) New S. Wales, Queensland.

3. *C. stricta*, Dry. Small tree or tall shrub with pendulous branches: branchlets with internodes  $\frac{1}{2}$  in. or more long, the whorls bearing mostly 10-12 lf.-scales: malespikes often 2 in. and more long, the lf.-whorls scarcely overlapping at maturity:

cones globular or ovoid, often 1 in. and more diam., the bractlet-valves smooth and prominently keeled. Widespread in Australia and Tasmania.—*C. distyla*, Vent. (*C. stricta*, Miq.), is a little bush or small tree, sometimes cult., lf.-scales about 7, moniliform male spikes with lf.-whorls not overlapping, and oblong cones  $\frac{3}{4}$ –1 in. long bearing truncate bractlet-valves with a dorsal protuberance. Australia, Tasmania.

### 35. PIPERACEÆ. PEPPER FAMILY

Herbs, shrubs, and even trees, sometimes climbers, in tropics and subtropics around the world, a very few cult. for ornament and for the commercial products; genera 9 to a dozen, and 1,000–1,200 species.—Plants often jointed at the nodes, sometimes succulent: lvs. mostly broad, sometimes very large, entire, frequently pellucid-dotted, commonly alternate but rarely opposite or whorled: fls. very small, in dense spikes or rarely in racemes, naked (without perianth) but each one with a subtending bractlet, bisexual or unisexual, regular; stamens 1–10; ovary 1-celled and 1-ovuled, the stigmas usually 1–4: fr. a dry or fleshy small indehiscent berry.

Anther-cells prominently 2 (sometimes apparently 4): mostly woody climbers or shrubs, or tree-like.....1. PIPER  
Anther-cells confluent into 1 (sometimes apparently 2): low herbs.....2. PEPEROMIA

1. **PIPER**, L. PEPPER. Species 600–700 on both sides of the world.—Sometimes tall herbs, but mostly woody climbers, shrubs, and small trees: lvs. alternate: fls. mostly unisexual (plant monœcious or diœcious), borne beneath decurrent bracts in slender catkin-like spikes; stamens mostly 1–4, the anthers of 2 distinct cells (the cells sometimes appearing as if again partitioned); stigmas 2–4, mostly 3. (Pi-per: the ancient name.)—The genus abounds in aromatic properties. The pepper of kitchen-gardens is *Capsicum* of the Solanaceæ. *P. excelsum*, Forst., sometimes grown under glass for a form with yellow-blotched lvs., is more properly *Macropiper excelsum*, Miq.: glabrous aromatic erect shrub or small tree from the South Seas and New Zeal.: lvs. 2–4 in. broad, cordate-orbicular to ovate, 7–9-nerved from the base; staminate spikes 2–3 in. long, the pistillate shorter.

Lvs. green, not spotted.  
Fr. sessile: lvs. broad-ovate to nearly orbicular.....1. *P. nigrum*  
Fr. pedicelled: lvs. elliptic-ovate or narrower.....2. *P. Cubeba*  
Lvs. spotted and mottled.....3. *P. ornatum*

1. ***P. nigrum***, L. PEPPER of commerce, sometimes grown with economic plants: strong somewhat woody glabrous climber with terete st. emitting roots: lvs. broad-ovate or -ovate-oblong to nearly orbicular, rounded or more or less cordate at base and oblique, 5–9-nerved: fls. bisexual or at base of slender but dense spike unisexual: fr. small, sessile, globose, yellowish-red,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam. Oriental tropics, but widely distributed in warm countries; the dried berries yield the black pepper of commerce; when the pericarp is removed, the product is white pepper.

2. ***P. Cubeba***, L.f. CUBEBA (E. Indian name), sometimes grown with economic plants, the berries being used in medicine: climbing when given support or more or less tree-like: lvs. glabrous, elliptic-ovate, oval, or narrower, short-acuminate, obliquely cordate, varying somewhat on plants of the two sexes: fr. nearly globose, with remains of stigma at top, brownish,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam. E. Indies.

3. ***P. ornatum***, N. E. Br. Glabrous climber, rooting at the nodes: lvs. slender-petioled, blade peltate, ovate-orbicular and with a short not acute point, 7-nerved,  $2\frac{1}{2}$ –5 in. long, the upper surface pink-spotted when young and whitish-spotted when old. Celebes.

2. **PEPEROMIA**, Ruiz & Pav. Probably more than 500 species in many parts of the world, a few of them pot-grown for foliage.—Mostly low herbs, not climbing, annual or perennial by tubers or creeping rootstock, more or less succulent: lvs. alternate, opposite or whorled, often color-marked and pellucid-dotted: fls. bisexual, very small, in dense but small and slender spikes; stamens 2, the anther-cells confluent to form a single anther (but by false



partition sometimes appearing 2-celled); stigma 1, capitate or tufted: fr. a small thin-coated berry. (Peperomia: *pepper-like*.)

Plant without evident st., erect, grown in pots for color-marked foliage.....1. *P. Sandersii*

Plant with branching st., grown in baskets and for mat effects.

Lvs. very small,  $\frac{1}{4}$  in. or less long.....2. *P. nummularifolia*

Lvs.  $\frac{3}{4}$  in. and more long.....3. *P. blanda*

1. *P. Sandersii*, C. DC. (*P. arifolia*, Hort., not Miq. *P. maculosa*, Hort., not Dietr.). Stemless or essentially so: lvs. broad-ovate or round-ovate, 3–5 in. long, peltate but often splitting with deep sinus at base at maturity, somewhat fleshy, smooth, with broad lighter-colored areas (in the var. *argyreia*, Bailey) between the 5–9 main veins, the long petioles dark red: peduncles branched, about equaling the lvs., bearing slender terminal spikes 1–3 or 4 in. long. (Named for Wilson Sanders.) Brazil.

2. *P. nummularifolia*, HBK. Low plant, 4–6 in. high from creeping sts., hairy: lvs. many and crowded, oblong to nearly or quite orbicular, about  $\frac{1}{4}$  in. or less long, very short-petioled: spikes very short, terminal. Trop. Amer.

3. *P. blanda*, HBK. Sts. long and weak, hairy: lvs. opposite or in 3's, obovate, pubescent, ciliate on margins, narrowed to very short petiole,  $\frac{3}{4}$ –1 $\frac{1}{2}$  in. long, obtuse or very short-acute: spikes filiform, 2–4 in. long, from the upper whorls and on the summits of divaricate branches. Venezuela to Bolivia.

### 36. SALICACEÆ. WILLOW FAMILY

Willows and poplars; 2 genera, of about 200 species mostly in temp. climates, most abundant in the northern hemisphere; trees and shrubs, many of them planted, but only the more hort. and the foreign ones are included here.—Rapid-growing soft-wooded plants with alternate simple stipulate lvs., petioles often gland-bearing: diœcious; fls. in catkins, mostly in early spring in advance of the lvs.; perianth lacking, the 1 or more stamens and single pistil borne in the axils of bracts, and a disk at base of fl.; stigmas mostly 2, often 2-lobed: fr. a 2–4-valved 1-celled small caps., bearing many seeds with long down or hairs.—The species in each genus hybridize extensively.

Stamens few, mostly 1 or 2: scales in catkins entire: disk gland-like: willows...1. SALIX

Stamens many: scales in catkins lacinate: disk cup-shaped: poplars.....2. POPULUS

1. SALIX, L. WILLOW. OSTER. Shrubs and trees, or in arctic and alpine regions certain species prostrate and almost herbaceous, of 160–170 species.—Plants with lithe branches and winter-buds covered with a single scale: stamens in caducous catkins, 3–12 (mostly 1 or 2) to a fl., distinct or united, borne under entire more or less hairy scales and accompanied by 1 or 2 small stalked glands; pistil in separate catkins, 1 under an entire also more or less hairy scale and with a small gland at base, the stigmas short: caps. 2-valved, the seeds with hair or down. (Sa-lix: classical name of willow.)—Many of the native willows are good ornamental subjects and are frequently planted; the descriptions will be found in the floras. There are also many hybrids in the collections of parks and nurseries, but these need not be considered here.

Catkins appearing in advance of the lvs., mostly lateral on the winter branches: "pussy willows."

Lvs. oblanceolate, glabrous on both surfaces; stipules wanting.....1. *S. purpurea*

Lvs. long-linear, revolute, white-tomentose beneath; stipules wanting.....2. *S. incana*

Lvs. lanceolate or narrow-lanceolate, not revolute, silky-hairy beneath; stipules present (on younger parts).....3. *S. viminalis*

Lvs. broad and short, white-tomentose beneath; stipules prominent (on young parts).....4. *S. Caprea*

Catkins appearing with or after the lvs. on short lateral more or less leafy shoots.

Lvs. broad (ovate or oblong-ovate), smooth and shining: stamens more than 3.....5. *S. pentandra*

Lvs. narrow (on the lanceolate order), glabrous, pubescent or sericeous.

Tree of erect or spreading growth.

Lf. glabrous: stamens 2 or 3.....6. *S. fragilis*

Lf. pubescent or silky: stamens 2.

|  |                         |
|--|-------------------------|
| Young branches bright yellow.....              | 7. <i>S. vitellina</i>  |
| Young branches green or brown.....             | 8. <i>S. alba</i>       |
| Tree with long pendulous (weeping) growth..... | 9. <i>S. babylonica</i> |

1. *S. purpurea*, L. PURPLE OSIER. Shrub or small tree with many long erect branches: lvs. oblanceolate, 1-3 in. long, glabrous, paler and somewhat glaucous beneath, finely serrulate, stipules wanting, sometimes nearly opposite, nearly or quite sessile: staminate catkins sessile, slender; pistillate catkins nearly sessile, slender and recurved; scales of catkins purple: caps. tomentose. Eu., and run wild somewhat in N. Amer.; planted for ornament and sometimes used in basketry; several forms.

2. *S. incana*, Schrank (*S. rosmarinifolia*, Hort., not L.). Shrub or small tree with long and slender branches: lvs. close together, linear and rather stiff, 2-3½ in. long, narrowed into very short petiole, revolute, white-tomentose beneath, stipules wanting: catkins slender, 1-1½ in. long, appearing just in advance of lvs., staminate practically sessile, pistillate more or less short-stalked and with leafy bracts at base: caps. glabrous. Eu.; common in cult.

3. *S. viminalis*, L. OSIER WILLOW. BASKET WILLOW. Large shrub or small tree with long slender straight greenish or brown branches: lvs. lanceolate to narrow-lanceolate (sometimes small and linear on fruit-bearing shoots), 3-6 in. long, long-pointed, entire, scarcely revolute, silvery-white beneath with fine silky pubescence, dark green and glabrous above, short-petioled, stipules small and narrow and soon falling: catkins sessile, 1-3 in. long: caps. pubescent. Eurasia; grown for use in basketry.

4. *S. Caprea*, L. GOAT WILLOW. SALLOW. Small tree or tree-like with brown twigs tomentose or pubescent when young: lvs. variable, broadly ovate to oval to oblong-orbicular, 3-6 in. long, mostly rounded or subcordate at base, rugose, obscurely irregularly toothed or jagged, felty-tomentose beneath, with stout pubescent glandless petioles, stipules prominent but soon caducous: catkins appearing well before the lvs., large, sessile, the staminate ones very showy: caps. long, pubescent. Eurasia; planted, but more common in var. *pendula*, Hort., KILMARNOCK WILLOW (grafted on other stock) with crooked drooping branches. (*Caprea* is a Latin name for a kind of goat.)

5. *S. pentandra*, L. (*S. laurifolia*, Hort.). LAUREL-LEAVED WILLOW. Attractive clean-looking shrub or small tree with shining brown twigs: lvs. ovate to ovate-oblong, 3-5 in. long and 1-2 in. broad, acuminate, finely and evenly serrate, glabrous, shining above and lighter beneath, short-petioled, usually gland-bearing at top of petiole and on lower margin, stipules broad but soon caducous: catkins long, appearing after the early lvs. are developed, on prominently leafy shoots: caps. glabrous. Eurasia; planted for windbreaks and screens.

6. *S. fragilis*, L. BRITTLE WILLOW. Tree to 50 or 60 ft. or more, rapid-growing, with brown or gray twigs, the branchlets breaking and falling freely: lvs. lanceolate or narrower, 3-6 or 7 in. long, long-acuminate, prominently glandular-serrate, glabrous, green both sides but paler beneath, short-petioled, usually with 2 glands at base of blade, stipules large but soon caducous and sometimes wanting: catkins slender, appearing with the lvs.: caps. glabrous, usually not fertile in this country. Eurasia; planted for hedges and shade, and also spontaneous.—*S. viridis*, Fries, is a form of this species or a hybrid derivative.

7. *S. vitellina*, L. YELLOW WILLOW. Large and wide-spreading tree with bright yellow young branches, of rapid growth: lvs. lanceolate or oblong-lanceolate, 2-4 in. long, acuminate, serrate, silky-hairy when young, glabrous at maturity, glaucous beneath, short-petioled, stipules ovate-lanceolate and caducous, glands minute or none: catkins slender, appearing with the lvs.: caps. glabrous. Eu.; common wayside tree in E. N. Amer., and escaped; there is a weeping form.

8. *S. alba*, L. WHITE WILLOW. Apparently less abundant than No. 7: branches brown: lvs. ashy-gray and silky throughout the season so that the tree has a whitish appearance. Eu.

9. *S. babylonica*, L. WEEPING WILLOW. Broad-headed large tree with long flexile hanging greenish or purplish branches: lvs. narrow-lanceolate, 3-6 in. long, sometimes falcate, very long-acuminate, finely serrate, more or less silky at first but soon becoming glabrous, pale and somewhat glaucescent beneath, short-petioled, glands minute or none, stipules very acute and soon falling or perhaps none: catkins very slender, appearing with the lvs.: caps. small and glabrous. China; supposed by Linnæus to be of the Babylonian region (whence the specific name); commonly planted.—There are several forms and hybrids. Var. *annularis*,

Forbes, is a state with curled ring-like lvs. The Wisconsin Weeping Willow is *S. blanda*, Anderss., a hybrid between *S. babylonica* and *S. fragilis*: less weeping, the branches pendulous and brownish or green: lvs. glabrous, glaucous beneath.

2. **POPULUS, L. POPLAR. ASPEN. COTTONWOOD** (from the floating seeds). Small or large trees, of 30-40 species, many of which are planted on roadsides and in public places for immediate effects and for windbreaks; native in the northern hemisphere, mostly in extra-trop. regions.—Wood soft and white: winter-buds with several or many scales: lvs. mostly broad, the petiole often much flattened sidewise: stamens in caducous catkins mostly 8-30 or more, under lacinate scales; pistils in separate catkins and also subtended by lacinate scales, the 2-4 stigmas often long; all fls. provided with a cup-like disk: caps. 2-4-valved, the seeds provided with copious down. (Pop-ulus: the classical name.)

Lvs. on at least the verdurous shoots white-tomentose or gray-canescenscent beneath, often lobed: White Poplars, with broad lvs. and petiole not distinctly flattened: buds pubescent, not viscid.

Under side of lf. cottony-white: lvs. usually more or less lobed ..... 1. *P. alba*

Under side of lf. somewhat cottony or tomentose but gray: lvs. usually not lobed. .... 2. *P. canescens*

Lvs. green or not tomentose beneath (when full grown), not lobed: buds not pubescent.

Petiole distinctly flattened, at least toward the blade, and the lf. exhibiting an unstable quivering motion.

Lf. rather small, orbicular or rhomboidal (to ovate on young shoots), coarsely notched: buds not viscid: Aspens. .... 3. *P. tremula*

Lf. triangular or ovate-triangular, broad on base, with long tapering apex and small close teeth: buds viscid: Black Poplars.

Teeth of lf. small and close, usually without marked incurved points; margin not ciliate. .... 4. *P. nigra*

Teeth prominent, with incurved callous points; margin of lf. usually sparingly ciliate. .... 5. *P. canadensis*

Lf. ovate to triangular-ovate, or sometimes broader than long, with mostly large open crenate or scalloped teeth that usually point upward; margins commonly finely ciliate, at least early in season: large wide-spreading trees: buds viscid, but not strongly resinous or balsamic: Cottonwoods. .... 6. *P. balsamifera*

Petiole not flattened, terete or channeled: buds strongly resinous, with balsamic odor, particularly the winter-buds as they open in spring: lvs. mostly ovate or narrower, whitened but not tomentose beneath: Tacamahacs, Balsam Poplars.

Lf. usually ovate; petiole glabrous. .... 7. *P. Tacamahacca*

Lf. broadly cordate; petiole more or less hairy or pubescent. .... 8. *P. candicans*

1. ***P. alba*, L. WHITE POPLAR. ABELE.** Large broad-headed much-branched suckering tree with bark white on young trunks and branches, but becoming rough and dark-colored on the older parts: lf.-buds downy-pubescent: lvs. broad-ovate to orbicular, irregularly angular-toothed or sinuate, often obscurely lobed, somewhat cordate at base, cottony-white beneath, those on the young shoots prominently palmately 5-lobed: catkins about 2 in. long or the staminate somewhat longer, appearing much before the lvs.; stamens 6-10; stigmas 2 and bifid, the linear parts standing cross-like, yellow. Eu.; frequently planted although not usually a desirable tree; also spontaneous about old yards and plantations.—There is a pendulous form, Var. *pyramidalis*, Bunge (*P. Bolleana*, Carr.), is a narrow-topped fastigiate tree (of very upright growth) with strongly lobed lvs.

2. ***P. canescens*, Sm. GRAY POPLAR.** Differs in having lvs. not lobed or only obscurely so, rather smaller, gray beneath and only sparingly cottony and sometimes glabrate: stigmas 2, more wedge-shaped, 3 4-lobed, purple. Eu., and frequent in this country, planted and partially spontaneous; by some regarded as a hybrid of Nos. 1 and 3.

3. ***P. tremula*, L. EUROPEAN ASPEN.** Small suckering open-headed tree: buds not sticky or only very slightly so: lvs. mostly small and rather thin, orbicular, rhomboidal or round-oval, with rounded angular irregular notches, glabrous and green on both sides, but sometimes whitened beneath when young, with very compressed petioles; lvs. on young shoots often ovate with rather small nearly regular teeth: catkins small; stamens commonly 6 8; stigmas 2, bifid. Eurasia; sometimes planted in this country.—There are purple-leaved and pendulous forms. The American representatives, *P. tremuloides*, Michx., and *P. grandidentata*, Michx., have yielded hort. forms but they appear to be little known. The former (the

common aspen) has lvs. with small close even serratures, very different from the big-notched lvs. of *P. tremula*; there is a pendulous var. of *P. grandidentata*, distinguished by its large mostly ovate and pointed coarsely dentate lvs., as well as by its habit.

4. *P. nigra*, L. **BLACK POPLAR**. Round-headed or somewhat pyramidal non-suckering tree of medium to large size, with gray bark: buds not woolly or pubescent, more or less viscid but not resinous or balsamic: lvs. triangular to ovate-triangular, or somewhat triangular-rhomboid, the blade mostly somewhat longer than broad, either gradually or abruptly acuminate, margins with small coarse teeth that are little or not at all incurved, petiole glandless or nearly so, both surfaces glabrous (at least at maturity) and green: stamens 12-25; stigmas 2, bifid; staminate catkins 2-3 in. long, pistillate shorter and ascending in fl. Eurasia; not commonly planted in this country.—Var. *betulifolia*, Torr., has young growth and petioles pubescent. Var. *italica*, Du Roi. **LOMBARDY POPLAR**. Staminate tree with very narrow tall erect growth and suckering habit: lvs. very broad, the blade mostly as broad as long. The black poplar is a variable species, and many named forms are associated with it; some of the forms are probably hybrids; some of them are very hardy, adaptable to the colder prairie regions.

5. *P. canadensis*, Moench. Hybrid between *P. nigra* and *P. balsamifera*, planted as a street tree under the name Carolina poplar: strong-growing upright tree with strongly ascending branches, the trunk or bole continuing through the top, little or not at all suckering: staminate only: lvs. mostly triangular-ovate, broadest at or below the middle, long-acuminate, truncate or slightly cuneate and lacking distinct glands at base, with prominent teeth or serratures terminating in an incurved callus, the margins usually with few short slight hairs: catkins 4-6 in. long, rather slender, pendent, from long pointed buds with large scales; disk stalked, bearing 30-40 anthers. The Eugene poplar, *P. canadensis* var. *Eugenei*, Schelle (*P. Eugenei*, Simon-Louis) may be involved in the street plantings and in the above diagnosis; it originated in nursery of Simon-Louis, near Metz, France, in 1832. The Carolina poplars need extended study.

6. *P. balsamifera*, L. (*P. monilifera*, Ait. *P. deltoidea* and *P. deltoides*, Authors). **COTTONWOOD**. Very large broad-headed tree with deeply furrowed, gray or brown bark on old trunks and branchlets gray or reddish-brown, the top breaking up into many great arms: winter-buds glabrous: lvs. large, ovate or nearly so, longer than broad, 4-7 in. long, abruptly acuminate and often long-pointed, somewhat cordate or almost truncate at base, rather closely crenate-serrate with callus-teeth, with 2 glands at base of blade near top of petiole, rather thick, shining above, lighter beneath: stamens numerous (60 or more): catkins slender, 2 in. or more long, the pistillate becoming 8-12 in. long in fr.: caps. twice or less as long as pedicel. Vt. to Miss., not common.—This tree apparently often passes as *P. angulata*, but it is doubtful whether it is the *P. angulata* known in Eu. and supposed to be of American origin or derived from American species. Var. *virginiana*, Sarg., **COMMON COTTONWOOD** of the E., differs in having mostly small lvs. that are triangular or ovate-triangular, about as broad as long. Throughout the country from Que. to Fla. and Tex., and to E. Neb. and Kans.—These trees are frequently planted. In Eu. various hybrids resulting from early introductions are planted, but the true American cottonwood appears to be rare there; some of the puzzling planted kinds in this country may be these hybrid forms introduced; the hybrids of this group are probably mostly with forms of *P. nigra*. The Norway or Sudden Sawlog poplar of the Minn.-Dak. region is apparently a form of *P. balsamifera* or hybrid from it, known for its very vigorous growth and great hardiness (staminate only?); it was brought prominently to notice in 1904, having been distributed from a Norwegian settlement in Minn.; it is supposed to be of Siberian origin. In the eastern foothill region of the Rocky Mts. from Canada to New Mex. and eastward to the Dakotas and Kans., *P. balsamifera* var. *virginiana* is represented by the native *P. Sargentii*, Dode, which bears light yellow branchlets, buds usually pubescent, lvs. mostly smaller, broader at base and fewer rather coarser teeth, the apex relatively long, caps. three or four times longer than pedicel. (Named in compliment to C. S. Sargent, Director of the Arnold Arboretum, Boston.) This tree is much planted along streets and for shelter. Farther west other cottonwoods are also planted from the wild, differing from the above in technical characters. If *P. balsamifera* is defined broadly, these various cottonwoods may be regarded as geographical races or subspecies.—The name *P. balsamifera* has traditionally been applied to the balsam poplar or tacamahac; it was not so founded by Linnæus, however, and a rearrangement of names is therefore necessary (see No. 7).

7. *P. Tacamahacca*, Mill. (*P. balsamifera*, Authors, not L.). **TACAMAHAC** (Indian name). **BALSAM POPLAR**. Large tall narrow-topped tree 75-100 ft. tall at



maturity and 6-7 ft. diam. at stump, the branchlets and sticky varnished winter-buds usually glabrous: lvs. thick and firm, erect or strongly ascending, ovate to ovate-lanceolate, gradually acuminate, obtuse or rounded (sometimes slightly cordate) at base, finely and obscurely serrate, prominently whitened beneath but glabrous, petioles glabrous: catkins drooping, peduncled, 2-3 in. long, the pistillate lengthening in fr.; stamens 20-30: caps. glabrous. N. New England to the Dakotas and westward and far northward; a characteristic tree of the high N.; much planted N. for ornament and protection.—On the Pacific side, Calif. to Alaska, its place is taken by *P. trichocarpa*, Hook., an immense tree with pubescent caps. and stamens more numerous. Several foreign species of the balsam poplar group are more or less planted in parks and arboreta. Hybrids or other derivatives have been introduced into the upper prairie region because of their hardiness, mostly from Russian and Siberian sources. *P. berolinensis*, Dipp., of which one parent is probably the Lombardy poplar, is a narrow columnar tree of vigorous growth, the growing parts pubescent when young but becoming glabrous: lvs. ovate or rhombic-ovate, rounded or sometimes cuneate at base, long-pointed, glabrous above and beneath, often somewhat whitish beneath with something of the look of balsam poplar group and at other times much more suggestive of Lombardy kind. Very different lvs. occur on shoots of the same tree. Either different trees present wide variations or more than one hybrid is passing under the name. Both sexes occur. *P. certinensis* is considered to be the staminate plant of *P. berolinensis*, but it is doubtful whether all the stock so named in N. Amer. (introduced from Eu. or Asia) is the same.

8. *P. candicans*, Ait. BALM-OF-GILEAD. More spreading tree than No. 7, not so large, with open irregular top, only the pistillate sex known, the large resinous buds very aromatic, the young twigs variously hairy mostly sparsely so, and heavy dark rich foliage whitish beneath: lvs. broad, cordate, more or less hairy at least on the veins beneath, the petioles thinly hairy to densely hairy and pubescent. Probably a hybrid of European origin, perhaps partly of American parentage; frequently planted, and apparently sometimes spontaneous.

### 37. JUGLANDACEÆ. WALNUT FAMILY

Six genera and about 35 species of deciduous trees native in the north temp. zone, in Amer. extending along the Andes to Bolivia, planted for ornament and the edible nuts.—Lvs. alternate, pinnately compound, exstipulate: plant monœcious; staminate fls. in drooping catkins with 3 to many stamens with an irregular perianth adnate to the bract or rarely perianth lacking; pistillate fls. solitary or several together, bracted and usually 2-bracteolate, with usually 4-lobed calyx adnate to the inferior ovary which is incompletely 2-4-celled but only 1-ovuled, stigmas 2-4-branched: fr. usually a drupe with dehiscent or indehiscent fibrous exocarp or husk, containing a large 2-4-lobed orthotropous seed.

Husk of fr. indehiscent: catkins of staminate fls. simple.....1. JUGLANS  
Husk of fr. splitting into 4 valves: catkins of staminate fls. branched.....2. CARYA

1. **JUGLANS, L. WALNUT.** About a dozen arborescent species, grown for their edible nuts and for ornament, native in N. and S. Amer., S. E. Eu. and Asia.—Branches with lamellate pith: lvs. odd-pinnate, of aromatic fragrance when bruised: staminate fls. in catkins on twigs of previous year, with 3-6-lobed calyx and 8-40 stamens in 2 or more series; pistillate fls. in few-fl. spikes at the end of shoots of the season, with 4-lobed calyx, 4 small petals adnate to the ovary at the sinuses, 2 short styles with club-shaped fimbriate stigmas: drupe large, with a thick indehiscent husk; nut irregularly furrowed, 2-4-celled at base, indehiscent or finally separating into 2 valves. (Juglans: ancient Latin name from *Jovis glans*, nut of Jupiter.)—Besides the species described below, the native black walnut, *J. nigra*, L., and the butternut, *J. cinerea*, L., are sometimes planted; also *J. californica* in S. Calif.

Frs. 1-3 together, glabrous: lfts. usually 7-9, almost entire.....1. *J. regia*  
Frs. in long racemes, covered with viscid hairs: lfts. 11-17, densely serrate.....2. *J. Sieboldiana*

1. ***J. regia*, L. PERSIAN WALNUT. ENGLISH WALNUT** of common speech, although not from England. Round-headed tree to 70 ft.: lfts. usually 7-9 (5-13),

oblong or oblong-ovate, acute or acuminate, almost glabrous, nearly entire, 2-5 in. long; frs. 1-3 together, green, almost globular, glabrous; nut reticulate and rather thin-shelled, 4-celled at base. S. E. Eu., Himalayas, China; planted in mild climates but races of it successful in N. Y.—There are many vars., some of which have pendulous branches, simple or 3-foliolate lvs., narrowly pinnately-cut lfts., elongated nuts.

2. **J. Sieboldiana**, Maxim. (*J. ailanthifolia*, Carr.). Broad-headed tree to 50 ft.: lfts. 11-17, oval to oval-oblong, short-acuminate, densely serrate, glabrous above, pubescent and usually glandular beneath, 3-6 in. long; frs. in long racemes, sometimes 20, globose to ovate-oblong, covered with viscid hairs; nut slightly rugose and pitted, rather thick-shelled, with thick wing-like sutures and pointed apex, 2-celled at base. (For Philipp Franz von Siebold, page 87.) Japan; hardy in northern states and Ont.—Var. **cordiformis**, Makino (*J. cordiformis*, Maxim.), has heart-shaped or ovoid much-flattened nuts, sharply 2-edged.

2. **CARYA**, Nutt. (*Hicoria*, Raf.). Deciduous trees with hard strong wood and smooth gray bark becoming rough or scaly on old specimens, of about 18 species in N. Amer. south to Mex. and 1 species in China.—Branches with solid pith: lvs. odd-pinnate; staminate fls. in slender pendulous 3-branched catkins, solitary or fascicled in axils of lvs., with 2-3-lobed calyx and 3-10 stamens in 2 or 3 series; pistillate fls. in terminal 2-10-flid. spikes, apetalous, with 1-celled ovary inclosed by 4-lobed involucre: fr. globular to oblong, with thick husk separating into 4 valves; nut bony, smooth or angled, incompletely 2-4-celled. (Ca-rya: Greek name for the walnut.)—The following is the only species regularly planted; others may be found in manuals of native plants.

**C. Pecan**, Aschers. & Graebn. (*Hicoria Pecan*, Britt.). PECAN (native Indian name). To 170 ft.: bark deeply furrowed: winter-buds yellow, scales 4-6, valvate: lfts. 11-17, short-stalked, oblong-lanceolate, acuminate, 4-7 in. long, serrate, usually glabrous at maturity: frs. 3-10 in terminal spikes, 1½-3½ in. long; nut oblong, smooth, brown, thin-shelled, pointed, 2-celled at base; kernel sweet. From Ia. and Ind. south to Tex. and Mex.

### 38. BETULACEÆ. BIRCH FAMILY

Deciduous trees and shrubs, of 6 genera and over 100 species, mostly in the northern hemisphere, some planted for ornament and others for the edible nuts.—Lvs. alternate, simple, straight-veined, petioled; stipules fugacious: plants monoecious; staminate fls. in long pendulous catkins, 1-6 together in the axils of the bracts, with 2-4-parted calyx or none and 2-20 stamens; pistillate fls. in short lateral or capitate catkins, with or without a calyx adnate to the 2-celled ovary, each cell containing 1 ovule, and 2-parted style: fr. a small indehiscent 1-celled 1-seeded nut or samara. *A, B*, Fig. 9, page 258.

Staminate fls. 3-6 together in the axils of each bract, with calyx: nut without an involucre; scales of pistillate fls. forming a woody strobile or cone.

Winter-buds covered by imbricated scales: pistillate catkins solitary, the scales deciduous (cone falling to pieces): stamens 2. . . . . 1. **BETULA**

Winter-buds without scales: pistillate catkins racemose, the scales persistent, becoming thick and woody, forming a lasting cone: stamens 4. . . . 2. **ALNUS**

Staminate fls. solitary in the axil of each bract, without calyx: nut more or less inclosed by involucre.

Pistillate fls. numerous, spicate: nut small, subtended by a large bract. . . . 3. **CARPINUS**

Pistillate fls. few, included in a small scaly bud: nut large, in a lf.-like involucre. . . . . 4. **CORYLUS**

1. **BETULA**, L. BIRCH. About 35 species of smooth-barked trees or shrubs native in N. Amer., Eu. and Asia.—Winter-buds covered by imbricate scales: lvs. serrate or crenate: staminate catkins formed in autumn and remaining naked during the winter, fls. 3 together in the axil of each scale, having a minute 4-toothed calyx and 2 stamens with 2-cleft filaments; pistillate catkins solitary at ends of branchlets, oblong or cylindrical, fls. without calyx, having 3 ovaries in axil of every scale which consists of 3 connate bracts: nut small

with membranaceous wings, deciduous at maturity together with scales of the strobile or cone. (Bet-ula: ancient Latin name.)

**B. pendula**, Roth (*B. alba* L., in part). Tree to 60 ft. with slender usually pendulous branches and white bark readily peeling off in layers: lvs. rhombic-ovate, acuminate, cuneate or truncate at base, doubly serrate, to  $2\frac{1}{2}$  in. long, glutinous when young but glabrous and shining at maturity; petioles slender, about 1 in. long: strobiles on slender peduncles, usually pendulous, cylindrical, about 1 in. long; wings of nutlet one and a half to two and a half times as broad as its body. Eu. to Japan.—Var. **Youngi**, Schneid., has very slender strongly pendulous branches and an irregular picturesque head. Other vars. have purple or lacinate lvs. and habit varying from upright to pendulous.

2. **ALNUS**, L. ALDER. Probably about 30 species of trees or shrubs with scaly bark, native in the northern hemisphere and the Andes of S. Amer.—Winter-buds without scales: lvs. serrate: staminate catkins appearing the preceding season, erect and naked during winter, fls. 3-6 together in the axil of each bract, having 4-parted calyx and usually 4 undivided stamens; pistillate catkins erect, clustered, developing into woody ovoid cones with persistent 5-lobed scales, fls. 2 in the axil of each bract, without calyx; nut very small, compressed, with or without wings. (Al-nus: ancient Latin name.)

**A. vulgaris**, Hill (*A. glutinosa*, Gaertn.). BLACK ALDER. Tree to 70 ft.: lvs. orbicular or obovate, to 5 in. long, rounded or emarginate at apex, irregularly serrate, downy in the axils of the veins beneath, glutinous when unfolding: fls. opening before lvs.; pistillate catkins axillary: cones peduncled; nut with narrow wings. Eu., N. Afr., Asia, locally naturalized in N. Amer.—There are several vars. in which the lvs. are pinnately lobed or incised.

3. **CARPINUS**, L. HORNBEAM. About 20 species of trees with smooth gray bark, native in Asia, Eu., N. and Cent. Amer., a few grown for ornament.—Winter-buds conspicuous, acute with many imbricate scales: staminate catkins sessile near the ends of short lateral branches of the preceding year, fls. solitary in the axils of bracts, without calyx, having 3-20 stamens with 2-forked filaments; pistillate catkins terminal on leafy branches of the year, each bract bearing 2 fls., the bracts and bractlets developing into a large leafy, more or less 3-lobed bract, embracing the small ovoid acute nut at their base. (Carpinus: ancient Latin name.)—The following hornbeam is the only one commonly planted; the native **C. caroliniana**, Walt. (*C. americana*, Michx.), the Blue Beech, may be distinguished by its smaller stature, the bracts of the involucre being smaller, broader and many-nerved at the base, and the lateral lobes smaller. **C. japonica**, Blume, sometimes planted, has the bracts of the involucre loosely appressed and dentate, giving a cone-like appearance.

**C. Betulus**, L. EUROPEAN HORNBEAM. Tree to 70 ft.: lvs. ovate or ovate-oblong, acute or acuminate, cordate or rounded at base, sharply and doubly serrate, 2-4 in. long; fr.-cluster to 5 in. long; bracts over  $1\frac{1}{2}$  in. long, 3-lobed, usually 3-nerved at base, middle lobe much longer, oblong-lanceolate, the margins almost entire or remotely denticulate. Eu. to Persia.—There are garden vars. with incised or lobed lvs., lvs. purplish when young, and of more upright habit.

4. **CORYLUS**, L. HAZELNUT. FILBERT. Shrubs or small trees grown for ornament or for the edible nuts, of about 15 species in N. Amer., Eu. and Asia.—Lvs. ovate to oblong, serrate: fls. appearing before the lvs.; staminate fls. solitary in the axil of each bract, formed the previous year and remaining naked during the winter, without calyx, having 4 divided stamens; pistillate fls. included in a small scaly bud with only the red styles protruding: fr. usually in clusters at the end of short branches, the large ovoid or oblong nut included in a leafy involucre which is nearly distinct or united into a tubular beak. (Cor-ylus: ancient Greek name.)—The native **C. americana**, Walt., may be planted; involucre about twice as long as the nut and usually tightly inclosing it.

**C. Avellana**, L. COMMON FILBERT. Shrub to 15 ft.: lvs. roundish-oval or obovate, slightly cordate, doubly toothed or slightly lobed, becoming glabrous, pubescent on veins beneath, 2-4 in. long; fr. in clusters of 1-4; involucre of 2 bracts irregularly divided into lanceolate or triangular lobes, shorter than the roundish-ovate nut. (Avellana: from Avellino, a city in Italy.) Eu., N. Afr., W. Asia.—Many vars. are cult. for their fr.; there are hort. forms having pendulous branches, lvs. purple or yellow or laciniately incised. Other species occasionally grown for their nuts are **C. Columna**, L., a tree to 70 ft., with the involucre deeply divided into linear lobes; **C. maxima**, Mill., a shrub or tree to 30 ft., with tubular pubescent involucre, gradually narrowed above the nut.

### 39. FAGACEÆ. BEECH FAMILY

Trees or shrubs, mostly natives of the subtrop. and temp. regions of the northern hemisphere, one genus in the antarctic, of about 5 genera and 600 species; some of them are important timber trees, and many are planted for shade and ornament.—Lvs. alternate, simple, cleft or entire, stipules deciduous: monœcious; fls. apetalous; the staminate in catkins or capitate, with 4-7-lobed perianth and 4-20 stamens; pistillate fls. solitary or slightly clustered, with 4-8-lobed perianth adnate to the 3-7-celled ovary, ovules 1-2 in each cell, but only 1 in the ovary ripening, styles 3-7: fr. a 1-seeded nut, inclosed in a cup or bur of partly or wholly united bracts.

Staminate fls. in small pendulous heads: nut sharply 3-angled.....1. FAGUS

Staminate fls. in slender catkins: nut rounded or plano-convex.

Involucre forming cup in fr. subtending acorns, 1-fld.....2. QUERCUS

Involucre forming prickly hard bur inclosing nuts, 2-7-fld.....3. CASTANEA

**1. FAGUS**, L. BEECH. Ornamental trees with smooth light gray bark, of about 8 species native in the cooler regions of the northern hemisphere.—Lvs. dentate, straight-veined: fls. appearing with the lvs.; staminate fls. in slender-peduncled pendulous heads, yellowish-green, subtended by deciduous scale-like bracts, with 5-7-lobed bell-shaped calyx and 8-16 stamens; pistillate fls. usually in pairs in an axillary peduncled involucre, with 6-lobed calyx adnate to 3-celled ovary, styles 3: nut brown, ovate, sharply 3-angled, 1 or 2 in a prickly involucre which dehisces into 4 valves. (Fa-gus: ancient Latin name.)—The native **F. grandifolia**, Ehrh. (*F. ferruginea*, Ait. *F. americana*, Sweet), is sometimes transferred from the wild; it differs from the European beech in its longer coarsely serrate lvs. with more pairs of veins, lighter bark and lvs. less shining and turning yellow instead of reddish-brown in fall.

**F. sylvatica**, L. EUROPEAN BEECH. To 80 or rarely 100 ft. high: lvs. ovate or elliptic, 2-4 in. long, remotely denticulate, with 5-9 pairs of veins, silky beneath and ciliate when young, dark green and glossy above, pale beneath: involucre 1 in. or more long, with mostly upright prickles. Cent. and S. Eu. to Caucasus.—Many vars. are cult., the most common of which are those having long pendulous branches, pyramidal habit, purple lvs., or lvs. deeply cut.

**2. QUERCUS**, L. OAK. Noble deciduous or evergreen trees, rarely shrubs, of 200-300 species native in temp. regions of the northern hemisphere and in the mts. of the tropics.—Lvs. short-petioled, serrate, lobed or pinnatifid, rarely entire: fls. appearing with or before lvs.; staminate fls. in slender pendulous catkins, with usually 6-parted calyx and 4-12 stamens; pistillate fls. in 1-many-fld. spikes in axils of young lvs., with 6-lobed calyx adnate to the 3- or rarely 4-5-celled ovary surrounded by an involucre of imbricated bracts which becomes the cup of the fr., styles as many as cells of ovary: fr. a 1-seeded subglobose to oblong nut (acorn), surrounded at base or sometimes almost inclosed by cup-like involucre. (Quer-cus: ancient Latin name.)—In addition to the following, some of the native species may be planted, particularly **Q. nigra**, L. (*Q. aquatica*, Walt.), Water Oak, deciduous, with 3-lobed obovate lvs.; **Q. virginiana**, Mill. (*Q. virens*, Ait.), Live Oak, an ever-



green with entire lvs. whitish-tomentose beneath; *Q. palustris*, Muench., Pin Oak, planted as a street tree, deciduous, the lvs. deeply cut into 5-7 lobes; other species are advertised, but they should be sought in the local manuals.

Foliage deciduous.

Cup of acorn with spreading and recurved scales.

Lvs. sinuately toothed.....1. *Q. dentata*

Lvs. pinnately lobed.....2. *Q. Cerris*

Cup with imbricate appressed scales.

Lvs. pubescent beneath.....3. *Q. conferta*

Lvs. glabrous beneath.

Petioles shorter than peduncles: fr. on long peduncles.....4. *Q. Robur*

Petioles longer than peduncles: fr. almost sessile.....5. *Q. sessiliflora*

Foliage evergreen.

Bark of trunk smooth.....6. *Q. Ilex*

Bark of trunk corky, deeply furrowed.....7. *Q. Suber*

1. *Q. dentata*, Thunb. Deciduous tree to 80 ft., with broad round-topped head: lvs. short-petioled, obovate, to 12 in. long, sinuately toothed with 3-6 rounded broad teeth on each side, dark green and finally glabrous above, light green and pubescent beneath: fr. almost sessile; acorn ovate, to almost 1 in. long, embraced one-half by large cup with thin spreading and recurved scales. Japan, W. China.—In one form of this species the lvs. are divided almost to the midrib.

2. *Q. Cerris*, L. TURKEY OAK. Deciduous tree to 120 ft., with broad pyramidal head: winter-buds surrounded and exceeded by slender subulate scales: lvs. oblong or obovate-oblong, deeply and unequally pinnatifid, with 3-8 pairs of entire or few-toothed lobes, dark green and somewhat rough above, grayish pubescent or finally glabrous beneath: fr. short-stalked, ripening the second year; acorn oblong-ovate, to 1 in. or more long, embraced about one-half by large mossy cup having spreading and recurved scales. (Cerris: probably from the Latin for *fringe*, referring to the mossy cup.) S. E. Eu., W. Asia.—Varies greatly in lf.-form and some of these are given varietal names.

3. *Q. conferta*, Kit. (*Q. pannonica*, Hort.). Deciduous tree to 120 ft., with a round-topped open head; bark rather light brown: lvs. very short-petioled, obovate, 4-7 in. long, deeply pinnatifid, with 5-7 pairs of often toothed lobes, dark green and almost glabrous above, pale and pubescent beneath: fr. with short peduncles; acorn ovoid-oblong, embraced about one-third by the cup which has rather large loosely appressed scales. Italy, S. E. Eu.

4. *Q. Robur*, L. (*Q. pedunculata*, Ehrh.). ENGLISH OAK. Deciduous tree to 120 ft., with broad round-topped head; young branches glabrous: lvs. short-petioled, oblong-obovate, with 3-7 rounded lobes on each side, quite glabrous, to 5 in. long: fr. on slender peduncles much longer than the petioles; acorn ovate or oblong, about 1 in. long, embraced about one-third by cup having imbricated appressed scales. (Robur: ancient name of an oak.) Eu., N. Afr., W. Asia.—Many vars. and hort. forms are described, with pendulous habit or lvs. variously divided, colored or variegated.

5. *Q. sessiliflora*, Salisb. Deciduous tree to 120 ft., with less spreading limbs and head less broad than in *Q. Robur*; young branches pubescent: lvs. on petioles sometimes 1 in. long, obovate to oblong, with 5-9 rounded lobes on each side, glabrous or sometimes slightly pubescent on midrib beneath, to 5 in. long: fr. almost sessile, somewhat larger than in *Q. Robur*. Eu., W. Asia to Persia.—Runs into a pendulous form and also vars. with variously lobed and colored lvs.

6. *Q. Ilex*, L. HOLLY or HOLM OAK. Evergreen tree to 60 ft., with large round-topped head; bark smooth: lvs. very variable, leathery, 1-3 in. long, ovate to lanceolate, serrate or entire, dark green above, yellowish or whitish tomentose or sometimes glabrescent beneath: fr. 1-3 together, ripening the first year, short-peduncled; acorn ovate, embraced about one-half by the cup having thin appressed or rarely slightly spreading scales. S. Eu.

7. *Q. Suber*, L. CORK OAK. Very similar to *Q. Ilex* but differing in its deeply furrowed, spongy and elastic bark and longer petioles. (Suber: ancient name of the cork oak tree.) S. Eu., N. Afr.

3. CASTANEA, Hill. CHESTNUT. Deciduous trees or shrubs with furrowed bark, grown for their edible nuts or for ornament, of about 10 species native in temp. regions of the northern hemisphere.—Branchlets without terminal bud; winter-buds with 3-4 scales: lvs. elliptic-oblong to lanceolate, serrate, straight-

veined: staminate fls. in long, erect, cylindrical, axillary catkins, with 6-parted calyx and 10–20 stamens; pistillate fls. usually 3 together in a prickly involucre, borne at the bases of the upper catkins, with 6-parted calyx adnate to 6-celled ovary and 6 linear styles: fr. a large brown nut, 1–7 together in a prickly 4-valved involucre or bur; nut rounded or plano-convex, marked at base with conspicuous pale oval thickened scar. (Castanea: classical name of the chestnut tree.)—*C. dentata*, Borkh. (*C. americana*, Raf.), the American Chestnut, may sometimes be planted; it differs from the European species in the nuts being about half as large and the lvs. nearly glabrous beneath even when young. In the trade, the nuts of *Bertholletia*, Brazil-nut, a very different tree of S. Amer., are often known as castaneas.

Margins of lvs. with spreading teeth, having marked rounded sinuses between; base of lvs. prevailing narrowed or rounded.....1. *C. sativa*

Margins of lvs. with teeth very close together, without sinuses; base of lvs. prevailing subcordate or truncate.....2. *C. crenata*

1. *C. sativa*, Mill. (*C. vesca*, Gaertn.). EURASIAN CHESTNUT. Tree to 80 ft.: buds large and glossy: lvs. oblong-lanceolate, prevailing narrowed or rounded at base, coarsely serrate with spreading teeth and marked rounded sinuses between, tomentose beneath when young, becoming nearly glabrous, dark green above, light green beneath, to 9 in. long: burs very large, with long branching spines; nut over 1 in. wide. S. Eu. and N. Afr. to China.—There are garden vars. with variegated and laciniately cut lvs.

2. *C. crenata*, Sieb. & Zucc. (*C. japonica*, Blume). JAPANESE CHESTNUT. Very similar to the above, but a small precocious tree to 30 ft. or a shrub: buds small: lvs. smaller than other chestnuts, oblong-lanceolate, prevailing subcordate or truncate at base, finely serrate, often teeth reduced to long bristle-like point, tomentose beneath when young: burs small with short widely branching spines; nut over 1 in. wide. Japan, China.

#### 40. ULMACEÆ. ELM FAMILY

Thirteen genera and about 140 species of deciduous trees and shrubs with watery juice, widely distributed in trop. and temp. regions, yielding important street and shade trees.—Buds scaly: lvs. alternate, simple, serrate, pinnately veined, petioled, stipules usually fugacious: fls. bisexual or monœciously polygamous, small, clustered or the pistillate solitary, apetalous; calyx 3–9-parted; stamens as many as calyx-lobes and opposite them, rarely twice as many, filaments straight; ovary superior, usually 1-celled, 1-ovuled, styles 2: fr. a samara, nut or drupe.—Some of the native species of *Celtis*, the Hackberry or Nettle-Tree, may sometimes be planted; the genus is distinguished from *Ulmus* by its drupaceous frs. and from *Zelkova* by its nearly distinct sepals and central stigma.

Fr. a samara: fls. on last year's branches.....1. *ULMUS*  
Fr. a drupe: fls. on the young growth.....2. *ZELKOVA*

1. *ULMUS*, L. ELM. About 20 species native in the northern hemisphere, well-known forest and street trees.—Buds with numerous imbricated scales: lvs. 2-ranked, unequal at base: fls. bisexual or rarely polygamous, in axillary clusters or racemes, on twigs of preceding season; calyx campanulate, 4–9-lobed; ovary sessile or stalked: fr. a flat ovate or roundish samara, with a broad, rarely narrow, membranaceous wing all around. (Ulmus: ancient Latin name of the elm.)

Fls. on slender pedicels, pendulous: fr. ciliate.....1. *U. americana*

Fls. short-pedicelled, in dense clusters, not pendulous: fr. not ciliate.

Fr. with seed in center.....2. *U. glabra*

Fr. with seed near apex.

Young branchlets pubescent: lvs. scabrous above.....3. *U. campestris*

Young branchlets glabrous or with few scattered hairs: lvs. nearly smooth above.

Lvs. 2–3½ in. long; petioles ¼–½ in. long.....4. *U. foliacea*

Lvs. larger, 3–5 in. long and petioles shorter, ¼–½ in. long.....5. *U. hollandica*

1. *U. americana*, L. AMERICAN ELM. Sometimes called WHITE or WATER ELM. Tall wide-spreading tree to 120 ft., much planted for avenues; bark gray and flaky; branchlets pubescent when young; lvs. ovate-oblong, to 6 in. long, abruptly acuminate, unequal at base, doubly serrate, glabrous and rough above, pubescent or almost glabrous beneath; fls. long-pedicelled, in drooping many-fl'd. clusters; stamens with bright red anthers, exserted; samara reticulate-veined, the margins densely ciliate, wings deeply notched. Newf. to Fla., west to base of Rocky Mts.—Varies much in form, sometimes being "feathery," having the limbs and main trunk clothed with short somewhat pendent branchlets, or often with slender pendulous branches.

2. *U. glabra*, Huds. (*U. scabra*, Mill. *U. montana*, With.). SCOTCH ELM. WYCH ELM. Tree to 120 ft., with round-topped head, without suckers; bark remaining smooth for many years; branches never with corky wings; young branchlets pubescent; lvs. very short-petioled, broadly obovate, 3-6 in. long, abruptly acuminate, sharply and doubly serrate, usually rough above and pubescent beneath; fls. short-pedicelled, clustered, not pendulous; samaras to 1 in. long, with small notch, seed in the center. Eu. to Japan.—The CAMPERDOWN ELM, var. *Camperdownii*, Rehd., has pendulous branches, forming a round head. There are other vars. varying in habit of growth and color of lvs. or bark.

3. *U. campestris*, L. (*U. procera*, Salisb.). ENGLISH ELM. Tree to 130 ft., with upright habit and oval head, usually suckering abundantly; bark deeply fissured; young branchlets pubescent; lvs. short-petioled, 2-3 in. long, broadly oval or ovate, short-acuminate, very unequal at base, coarsely and doubly serrate, dark green and scabrous above, pubescent beneath; fls. in clusters, short-stalked; fr. with short closed notch at apex, seed touching base of notch. England, W. and S. Eu.—Var. *Wentworthii*, Schelle, has pendulous branches. There are forms with variegated and colored lvs.

4. *U. foliacea*, Gilib. SMOOTH-LEAVED ELM. Tree with straight trunk, wide-spreading branches and usually pendulous branchlets, suckering; bark deeply fissured, gray; young branchlets glabrous or nearly so; lvs. with petiole  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, oval or obovate, 2– $3\frac{1}{2}$  in. long, acuminate, lustrous and smooth above, with white axillary tufts beneath, doubly serrate; fls. short-pedicelled; fr. obovate, cuneate at base, broad and rounded at apex, the seed near apex and nearly touching the closed notch. Eu., N. Afr., W. Asia.—There are many garden and geographical forms. Some of them are as follows: Var. *Dampieri*, Rehd., a fastigiate tree with narrow pyramidal head; var. *Wredei*, Rehd., similar but with yellow lvs.; var. *Wheatleyi*, Rehd., WHEATLEY, JERSEY or GUERNSEY ELM, with narrow pyramidal head; var. *Koopmannii*, Rehd., with dense oval head; var. *Webbiana*, Rehd., a pyramidal tree of dwarf habit and small curled lvs.; var. *umbraculifera*, Rehd., with dense globose head; var. *Ruepellii*, Rehd., similar but with slightly corky branches and pubescent branchlets. There are other forms varying in habit or with variegated lvs.

5. *U. hollandica*, Mill. (*U. Dippeliana*, Schneid. *U. glabra*  $\times$  *U. foliacea*). DUTCH ELM. Tree to 100 ft. or more, with short trunk and wide-spreading branches, suckering; bark deeply fissured; young branchlets glabrous or with few scattered hairs; lvs. with petiole  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broadly oval, 3–5 in. long, acuminate, lustrous and nearly smooth above, slightly pubescent beneath; fls. short-pedicelled; fr. oval-obovate,  $\frac{3}{4}$ –1 in. long, with seed near apex and touching the base of the notch.—The HUNTINGDON ELM, var. *vegeta*, Rehd. (*U. Huntingdonii*, Hort.), is an erect vigorous-growing form; var. *belgica*, Rehd., the BELGIAN ELM, is good for street planting, of spreading habit and rapid growth; the DOWNTON ELM, var. *pendula*, Rehd., has pendulous branchlets. Many other vars. and garden forms are known.

2. ZELKOVA, Spach. About 5 species of trees native in Crete, the Caucasus and E. Asia, one of which is hardy N. and grown as an avenue or specimen tree.—Lvs. short-petioled, serrate; fls. polygamous, borne on the young growth; staminate fls. clustered in the axils of the lower lvs., calyx campanulate, 4-5-lobed, stamens 4-5; pistillate or bisexual fls. solitary in the axils of the upper lvs.; fr. a 1-seeded drupe, usually broader than high, oblique, with eccentric style. (Zelko-va: from the vernacular name in Crete or the Caucasus.)

*Z. serrata*, Makino (*Z. acuminata*, Planch. *Z. Keaki*, Mayr.). Tree to 100 ft., with broad round-topped head; branches slender, not spiny; lvs. ovate to oblong-ovate, 1– $2\frac{1}{2}$  in. long, acuminate, rounded or slightly cordate at base, sharply and coarsely serrate, glabrous; fr. not winged. Japan.

# 41. MORACEÆ. MULBERRY FAMILY

As now delimited, the Mulberry Family comprises about 55 genera and 900-1,000 species of herbs, shrubs, and trees, sometimes vines, in many parts of the world, yielding various subjects for hort.—Plants often with milky juice: lvs. mostly alternate and usually simple: fls. small and inconspicuous, regular, mostly imperfect and plants monœcious or diœcious, usually aggregated into heads or spikes or the staminate racemose, the pistillate sometimes (Ficus) on the inside of a hollow receptacle or (as in *Dorstenia*, not treated here) on a much-flattened expanded receptacle; perianth single, without clear distinction of sepals and petals, in 1-6, mostly 4, imbricated parts which are of the same number as the stamens and opposite them; ovary 1-2-celled and 1-2-ovuled, superior; stigmas 1-2: fr. various, sometimes a separate achene as in hemp, sometimes achenes or drupes imbedded in or enveloped by the thickening fleshy perianth and thereby forming a syncarp as in mulberry, or achenes contained inside a fleshy body or syncarp as in the fig.

- Species woody, arborescent, with milky juice: fr. not a separate achene.
- Fls. external, in a dense spike or head.
- Sterile and fertile fls. in separate similar short small catkin-like spikes: lvs. dentate and often lobed.....1. *MORUS*
- Sterile fls. in catkin-like spikes, the fertile in dense globular small heads: lvs. dentate or serrate, often lobed.....2. *BROUSSONETIA*
- Sterile fls. in short loose racemes, the fertile in dense globose heads forming large syncarps: lvs. entire.....3. *MACLURA*
- Sterile fls. in large dense thick oblong or club-shaped spikes, the fertile in short large dense heads forming great syncarps: lvs. large, various.....4. *ARTOCARPUS*
- Fls. inside a closed receptacle that arises from an axil like a branch:
- lvs. thick, entire or lobed.....5. *FICUS*
- Species herbaceous, with watery juice: fr. an achene. (Sometimes separated as family Cannabinacæ).
- Plant an erect herb: lvs. digitate.....6. *CANNABIS*
- Plant a twining vine: lvs. lobed.....7. *HUMULUS*

1. *MORUS*, L. MULBERRY. Trees cult. for the edible fr. and the lvs. for silkworm forage; the genus has about 10 species, although they are so variable that ten times that many have been described; temp. and warm temp. regions, eastern and western hemispheres.—Plants without spines, with milky juice, alternate simple but variously lobed lvs. that are 3- or 5-nerved from base: monœcious or diœcious; fls. in small hanging cylindrical catkin-like spikes, the staminate soon falling, the pistillate ripening into a blackberry-like juicy syncarp; perianth 4-parted; stamens 4, incurved in the bud; ovary small, sessile, style 2-parted, becoming a drupelet inclosed in the enlarging succulent perianth: seed pendulous. (Mo-rus: the classical name.)—The native *M. rubra*, L., is sometimes planted, but has not been improved horticulturally although some of the larger-fruited wild forms have been named from time to time: lvs. rough above and pubescent beneath.

- Lvs. usually glossy above and nearly glabrous.....1. *M. alba*
- Lvs. dull green, rough or pubescent.
- Lf. broadly cordate-ovate, abruptly short-pointed.....2. *M. nigra*
- Lf. long-ovate, not cordate or only slightly so, long-pointed.....3. *M. multicaulis*

1. *M. alba*, L. WHITE MULBERRY. Wide-spreading round-headed tree, trunk attaining 2 ft. diam., branches gray or grayish-yellow: lvs. thin, light green, rather small (blade 2-4 in. long), broad-ovate to orbicular-ovate (more unusually oblong-ovate), rounded at apex or short-acute, base semi-truncate to subcordate and mostly oblique, shining above, glabrous or with slight pubescence particularly on veins and in axils beneath, margins coarsely scallop-toothed, often oddly and irregularly lobed: fr. variable, 1-2 in. long in improved forms but often much smaller, whitish to dark violet or purple, sweet. China; escaped about roads, premises, and margins of woods in N. Amer.—Var. *tatarica*, Loudon, RUSSIAN MULBERRY, is mostly a smaller bushy tree, very hardy, lvs. small and commonly much lobed, frs. very small. The hardy fr.-bearing mulberries of the N. U. S. and Canada are forms of



*M. alba*; there are also ornamental forms, as the cut-leaved (*laciniata*), fastigiate (*pyramidalis*), and weeping (*pendula*) which is grafted on upright stocks; grown also for feeding silkworms.

2. *M. nigra*, L. BLACK MULBERRY. Rather small spreading tree with dark heavy foliage and more or less pubescent young growth, twigs dark-colored: lvs. rather thick, dull green and not glossy, cordate-ovate with a deep and nearly or quite symmetrical basal sinus, abruptly short-pointed, rough above, more or less pubescent beneath, margins with coarse angled or pointed teeth, sometimes lobed: fr. large, purple to black. Asia; provides the fr.-bearing vars. of S. Eu., and also planted in the S. U. S. and Calif., hardy only in protected places in N. Y. and New England.

3. *M. multicaulis*, Perr. Very large shrub with many trunks or sometimes a tree, with gray or brown twigs: lvs. very large (blade often 1 ft. and more long on strong shoots), dull green, mostly long-pointed, ovate, semi-truncate or shallowly cordate at base, rough above and more or less pubescent on veins beneath, margins with many scalloped or somewhat acute teeth, seldom lobed: fr. black, sweet. China, used for silkworm forage, and long ago introduced into this country for that purpose and still to be found in old places; the original Downing mulberry, grown for fr., was probably of this species.

2. BROUSSONETIA, L'Her. PAPER-MULBERRY (bark used for paper-making in the Far East). Three or 4 trees or large shrubs in E. Asia, one planted in this country for ornament and also more or less run wild, N. Y. and southward.—Juice milky: lvs. alternate, petioled, serrate or dentate, often lobed: diœcious; fls. small, the staminate in nodding cylindrical spikes, pistillate in dense globular short-stalked small heads; stamens 4, the perianth 4-parted; pistillate fls. with a tubular toothed perianth, ovary stalked, style filiform: fr. a collection of orange-red drupelets standing in the persistent perianths and bracts, forming a small globular syncarp. (Broussonetia: Auguste Broussonet, 1761–1807, was a French naturalist.)—The name Papyrus, Lam., has recently been used for this genus.

*B. papyrifera*, Vent. (*Papyrus papyrifera*, Kuntze). Tree to 40 or 50 ft., with grayish pubescent twigs: lvs. mostly ovate or oblong-ovate in outline, usually deeply lobed with obtuse sinuses, the lobe often on only one side, margin serrate, apex prominently pointed, petiole 1–4 in. long, rough above and grayish-tomentose beneath: pistillate spikes with long projecting styles, ripening into a globular tomentose syncarp about  $\frac{3}{4}$  in. diam. China, Japan; variable.

3. MACLURA, Nutt. (*Ioxylon*, Raf. *Toxylon*, Sarg.). OSAGE-ORANGE. One species in the Ark.-Tex. region, much used for hedges.—Tree to 50–60 ft. high, with glabrous twigs, axillary spines, and entire long-pointed oblong-lanceolate glabrous slender-petioled lvs.: diœcious; fls. very small, the staminate in short racemes with 4-parted perianth and 4 inflexed stamens; pistillate in a small dense globular head with 4-parted perianth inclosing the ovoid sessile ovary, styles filiform and exserted: fr. a syncarp, formed of the enlarged fleshy perianths in which the drupelets are embedded. (Maclura: William Maclure, American geologist.)

*M. pomifera*, Schneid. (*M. aurantiaca*, Nutt.). Known in cult. mostly as a large bush, sometimes as a small tree: syncarp as large as an orange (4–5 in.), yellow; wood orange; bark contains tannin. There is a spineless form.

4. ARTOCARPUS, Forst. About 50 milky-juiced trees of Asiatic tropics and Polynesia, two planted in our extreme southern borders and in trop. regions for the edible fr.—Lvs. alternate, large and stiff, entire or lobed or compound: monœcious; fls. small and very numerous, on a fleshy rachis; staminate fls. on oblong or club-shaped stiff spikes, 2 or more in. long, perianth 2–4-lobed and stamen 1; pistillate fls. in a dense globose or oblong, usually large head, the perianth tubular and immersed in the fleshy rachis, contracted and toothed at top, inclosing the ovary, style mostly exserted and stigma

entire or 2-3-lobed: fr. a syncarp, containing the large seeds (or seedless by abortion) imbedded in the flesh, echinate or prickly (in ours) from the hardened projecting apices of the perianths and carpels. (Artocarpus: Greek *bread-fruit*.)

Lvs. deeply lobed.....1. *A. communis*  
Lvs. usually entire.....2. *A. integra*

1. *A. communis*, Forst. (*A. incisa*, L.f.). BREAD-FRUIT. Striking broad tree to 50 ft. and more, with heavy profuse foliage: lvs. very large ( $1\frac{1}{2}$ -2 ft. and more long), thick and leathery, stout-petioled, ovate in general outline, narrowing and entire at base, pinnately several-lobed with narrow sinuses and acute lobes, more or less pubescent beneath and on the veins above, the large stipules deciduous: staminate spikes 6-12 in. or more long, club-shaped, yellow, drooping or downward-curving; pistillate spike globular to oblong, ripening into an echinate syncarp 4-8 in. diam. Polynesia, now widely dispersed in trop. countries where it is grown for edible frs.—The frs. are commonly seedless or nearly so, but a seed-bearing race is grown under the name bread-nut, the seeds being eaten; the pericarp is about 1 in. long, with a rounded back and flattened or with 2 flat faces, immersed in the pulp of the syncarp. The bread-fruit is eaten cooked, more as a vegetable than dessert fr.

2. *A. integra*, Merr. (*A. integrifolia*, L.f.). JAK-FRUIT. Tree 30-50 ft. or more: lvs. stiff, elliptic or obovate, 4-8 in. long, very short-blunt-pointed, entire or 3-lobed on young shoots, glabrous: staminate spikes cylindric or clavate, 3-4 in. long, terminal or axillary; pistillate spikes cylindric or oblong, arising from the trunk and main branches and maturing into great syncarps 1-2 ft. long and weighing 20-40 lbs. India to Malaya, but now widely dispersed, the fr. eaten by natives and coolies.

5. *FICUS*, L. FIG. Woody plants, trees, erect shrubs, and climbers, in great variety in many trop. and subtrop. countries, 700-800 species; one grown for its fr. and many others for shade and ornament; some of the species are at first epiphytal and become self-supporting when they have strangled the host.—The genus is distinguished by its peculiar syncarp, the minute fls. being on the inside of a closed pyriform, ovoid, or globose receptacle or branch that arises from the axil of a present or former lf. or is supernumerary, the receptacle ripening into a more or less fleshy body (fr.) with the many achenes, succulent pedicels, and inter-floral scales, on the inner walls; staminate perianth 2-6-parted, with 1 or more erect stamens; pistillate perianth sometimes wanting; receptacles unisexual or bisexual, usually the latter; pollination performed by special insects. (Fi-cus: ancient Latin name of the fig.)—Two species are indigenous in S. Fla., *F. aurea*, Nutt., and *F. brevifolia*, Nutt. (*F. populnea*, Sarg.). The former has frs. sessile or nearly so, the latter long-stalked; both are epiphytal trees, sometimes planted. Aside from the common fig and the species grown by florists as pot and tub specimens, the tree-like kinds described here are planted only in S. Fla., S. Calif., and similar climates, and southward in the tropics. The species planted in this country are not well understood. They are either evergreen or deciduous: lvs. mostly alternate.

- A. Fig large and edible: lvs. deeply lobed, rough above and pubescent beneath: the fig of commerce..... 1. *F. carica*  
AA. Fig medium to small, not eaten: lvs. various: grown for ornament and shade.  
B. Plant erect or essentially so: trees and shrubs.  
C. Foliage much variegated..... 2. *F. Parcelli*  
CC. Foliage uniformly green, not variegated or spotted.  
D. Lvs. fiddle-shaped, very large..... 3. *F. lyrata*  
DD. Lvs. with a long tail at end..... 4. *F. religiosa*  
DDD. Lvs. otherwise, not unusual in shape.  
E. Lf.-blade lobed or deeply notched, little rough above: small shrub..... 5. *F. quercifolia*  
EE. Lf.-blade undulate or coarsely dentate, sometimes lobed, very rough: large shrub or small tree..... 6. *F. ulmifolia*  
EE. Lf.-blade not lobed: trees.  
F. Stipular sheaths large and showy, rosy..... 7. *F. macrophylla*  
FF. Stipular sheaths not so.  
G. Large primary lateral nerves 12 or less on either side midrib.

- H. Blade of lf. small, some or most of them round-ovate, with glands at narrow base..... 8. *F. diversifolia*  
 HH. Blade otherwise.  
   I. Frs. (receptacles) in clusters on leafless branchlets or tubercles. (No. 7 not to be sought here.)..... 9. *F. glomerata*  
 II. Frs. axillary or from lf.-scars, mostly 1 or 2.  
   J. Young parts glabrous.  
     K. Petiole about  $\frac{1}{2}$  in. (to 1 in.) long.  
       L. Tip of lf. apiculate..... 10. *F. nitida*  
       LL. Tip not apiculate..... 11. *F. indica*  
     KK. Petiole about 1  $\frac{1}{2}$  in. or more long..... 12. *F. insectoria*  
   JJ. Young parts pubescent or hairy, mostly becoming glabrous.  
     K. Base of lf. mostly somewhat cordate..... 13. *F. benghalensis*  
     KK. Base prevalingly rounded or tapering.  
       L. Lateral 2 nerves at base of lf. ascending and very prominent..... 14. *F. altissima*  
       LL. Lateral nerves at base not ascending or not conspicuous.  
       M. Under surface of lf. pubescent..... 15. *F. rubiginosa*  
       MM. Under surface glabrous..... 16. *F. Nekbudu*  
 GG. Large primary lateral nerves more than 12 on either side.  
   H. Stipular sheath rosy: lvs. 5-12 in. long..... 17. *F. elastica*  
   HH. Stipular sheath not conspicuous: lvs. 5 in. or less long..... 18. *F. benjamina*  
 BB. Plant climbing or trailing, often rooting on walls. (No. 5 is not to be sought here.)  
   C. Lvs. not cordate or only slightly notched at base..... 19. *F. radicans*  
   CC. Lvs. unequally cordate..... 20. *F. pumila*  
   CCC. Lvs. with one side undeveloped at base, small, oblong-rhomboidal..... 21. *F. falcata*

1. *F. carica*, L. COMMON FIG. Small soft-wooded much-branched tree to 30 ft.: lvs. thick, long-petioled, strongly palmately ribbed, the blade broad-ovate to nearly orbicular in outline, deeply 3-5-lobed, rough above and pubescent beneath: fr. single, axillary and subterminal, pear-shaped, variable in size and in many vars. (Ca-rica: named for Caria in Asia Minor.) Medit. region.

2. *F. Parcelli*, Veitch. Shrub, with pubescent young growths: lvs. thin, oblong-oval or -ovate, acuminate, short-petioled, obliquely subcordate at base, thinly hairy particularly beneath, green above and strongly marked with cream-white mosaic, lighter beneath, margin sinuate: fr. axillary, globular, short-peduncled, pubescent, often 3-colored. (Bears the name of Mr. Parcell, collector for an Australian firm.) Pacific Isls.; often grown under glass.

3. *F. lyrata*, Warb. (*F. pandurata*, Sander). Tree to 40 ft., but grown under glass as a pot and tub subject, growths nearly or quite glabrous: lvs. very large, blade 10-15 in. long, thick, fiddle-shaped with the large end rounded, nearly truncate or even sunken, but mostly with a short point in the center, with few strong pinnate ribs, margin somewhat wavy but entire, petiole short and stout and base cordate, dull green above and lighter beneath, glabrous: fr. in pairs at axils, sessile, globular or nearly so, about 2 in. diam., pitted with white dots. Trop. Afr.

4. *F. religiosa*, L. PEEPUL. BO-TREE. Large tree, usually epiphytal, glabrous: lvs. singular in having a terminal narrow projection or tail as much as one-half the length of the remainder of the blade which is round-ovate with a truncate or semi-cordate base, margin entire, petiole long and slender: fr. in axillary pairs, sessile, glabrous, nearly globular,  $\frac{1}{2}$  in. diam., dark purple. The most sacred tree in India, where it is native.

5. *F. quercifolia*, Roxb. Shrub or somewhat prostrate, young growths pubescent: lvs. elliptic or ovate in outline, 2-5 in. long, lobed and notched on the sides but margin not finely serrate, short-pointed, narrowed or somewhat rounded at base, petiole 1 in. more or less, green, rough beneath and perhaps above: fr.  $\frac{1}{2}$  in. or less diam., single or in pairs in axils, peduncled, globular or ovoid, rough. Burma and southeastward; grown under glass for its decorative foliage.

6. *F. ulmifolia*, Lam. Tall shrub with rough and hispid twigs: lvs. variable, oblong or elliptic, very rough on both surfaces, abruptly mostly long-pointed, narrow or rounded at base, short-petioled, undulate or dentate or sometimes deeply lobed, blade 5-7 in. long: fr. solitary or twin, axillary, peduncled, ovoid or ellipsoid, about  $\frac{1}{2}$  in. long, orange-red or purplish. Philippines.

7. *F. macrophylla*, Desf. MORETON BAY FIG (from the inlet of that name in Queensland). Very large tree in its native place in N. New S. Wales and Queensland, planted in S. Calif., glabrous: lvs. thick, oval, elliptic to oblong, obtuse or only short-pointed, rounded or somewhat narrowed at base, margins entire, main lateral nerves not many but secondary ones numerous, petioles medium to short, stipules

often more than 2 in. long and showy: fr. 3-4 together on a peduncle, globular or pyriform, nearly or quite 1 in. diam.

8. *F. diversifolia*, Blume (*F. lutescens*, Desf.). MISTLETOE FIG (bears resemblance to mistletoe in foliage and is sometimes epiphytal). Shrub or small tree, but grown as a pot plant, glabrous, young parts with caducous scales: lvs. various on same shoot, some of them perhaps elliptic but most of them broadly obovate with wide rounded top, 2 in. or less long, entire, tapering into a very short petiole, with small dark glands beneath in the axils of veins: fr. single or twin in the axils, peduncled, nearly globose to pyriform,  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam., yellow. Malaya.

9. *F. glomerata*, Roxb. CLUSTER FIG. Tree, making dense shade, young growths glabrous or nearly so: lvs. ovate to oblong, 4-6 or 7 in. long, strongly marked with 4-6 lateral nerves, short-acute, petiole 1-2 in., base rounded, margin entire, mostly glabrous above and either pubescent or glabrous beneath: fr. several or many on short scaly leafless branchlets, about 1 in. diam., top-shaped to nearly globular, reddish. India.

10. *F. nitida*, Thunb. Large evergreen, producing few aerial roots, glabrous: lvs. broad-ovate to rhomboid-elliptic, apiculate, narrowed at base, 3-4 in. long, with 5 or 6 nerves on each side of rib, petiole  $\frac{1}{2}$  in. or less long: fr. small (about  $\frac{1}{2}$  in. diam.), sessile in pairs at axils, yellow. India: perhaps a form of *F. retusa*, L.

11. *F. indica*, L. Large wide-spreading leafy tree, shoots glabrous: lvs. thick, small, 3-6 or 7 in. long, oblong, acute or acuminate, base narrowed and with 2 prominent nerves, main nerves 4-6 on either side, glabrous, finely pimpled at least above, petiole  $\frac{1}{2}$  in. long but sometimes to 1 in.: fr. in pairs, sessile, about  $\frac{1}{2}$  in. diam., mostly globose, smooth, yellowish-red. Burma, Malaya; often called "Evergreen" in the W. Indies.

12. *F. infectoria*, Roxb. (*F. lutescens*, Blume). Deciduous, glabrous: lvs. thin, ovate or oblong-ovate, 3-5 in. long, short-acuminate, base rounded or subcordate and 3-nerved, margins entire but slightly undulate, petioles  $1\frac{1}{2}$ -2 in. and slender: fr. in pairs in axils, sessile, globose,  $\frac{1}{4}$  in. diam., whitish tinged red and dotted. India.

13. *F. benghalensis*, L. BANYAN. Large evergreen tree reaching 100 ft. high and extending laterally indefinitely by sending down trunks from the branches, young growths pubescent: lvs. ovate to orbicular-ovate and elliptic, 4-8 in. long, obtuse, usually subcordate at base, margins entire, glabrous or nearly so on both surfaces, petioles long or short: fr. in axillary pairs, sessile, about  $\frac{1}{2}$  in. diam., globose, slightly pubescent, red. India.

14. *F. altissima*, Blume. Large spreading tree, with young parts lightly pubescent, aerial roots few: lvs. thick, oval or ovate-elliptic, with a short and obtuse apex, base rounded but not cordate and with 2 strong ascending side nerves, margins entire, glabrous both surfaces, petioles  $1\frac{1}{2}$  in. or less long: fr. in axillary pairs, sessile, when young inclosed in pubescent bracts, about  $\frac{3}{4}$  in. diam. when mature and red or yellowish. India.

15. *F. rubiginosa*, Desf. Spreading tree, throwing down roots that form trunks, the young parts rusty-pubescent: lvs. oval or elliptic, 3-4 in. long, with short obtuse apex, rounded or slightly cordate at base, margins entire, glabrous above and rusty-pubescent beneath, primary nerves 10-12 on either side with secondary ones between, petioles 1 in. or less long: fr. mostly in pairs, axillary, peduncled, globular, about  $\frac{1}{2}$  in. diam., usually warty. New S. Wales.

16. *F. Nekbudu*, Warb. (*F. utilis*, Sim). Great forest tree, yielding cloth for the natives in trop. Afr., where it is native; young growth closely pubescent: lvs. standing nearly horizontal, thick, 6-15 in. long, elliptic or somewhat obovate, rounded or with slight obtuse elevation at apex, rounded or slightly subcordate at base, glabrous both sides, with about 5 strong distant side veins, margins entire, petiole 2-4 in. long: fr. sessile, mostly in pairs in the axils, nearly globular, about  $\frac{1}{2}$  in. diam. (Nekbudu is apparently an African vernacular name.)—Grown somewhat under glass for decoration.

17. *F. elastica*, Roxb. RUBBER-PLANT of greenhouses and living-rooms. A large forest tree in India and Malaya, often epiphytal part of its life, grown with us in its juvenile state as a pot or tub plant; source also of Assam or India rubber: glabrous throughout: lvs. very thick, deep glossy green (a variegated or yellowed form), with very many fine parallel side-nerves, 5-12 in. long, oblong or elliptic with a rather short sharp point, rounded or somewhat narrowed at base, petiole stout and 1-2 in. long: fr. in pairs in old axils, sessile, oblong, yellowish, about  $\frac{1}{2}$  in. long.

18. *F. benjamina*, L. Very large broad-headed tree with drooping branches, glabrous, the young trees with a light somewhat poplar-like aspect: lvs. small,



2-5 in. long, shining and moderately thick, oval to ovate-elliptic, rather abruptly narrowed into a short not sharp point, rounded or somewhat narrowed at base, finely many-nerved, margin entire, petiole 1 in. or less long; fr. in sessile axillary pairs, globular or ovoid,  $\frac{1}{3}$  in. diam., becoming red, or in var. *comosa*, Kurz.,  $\frac{3}{4}$  in. diam. and yellow. India.—The name *benjamina* was probably bestowed because of the supposed relation of the tree to the source of a resin or benzoin early procured from the East.

19. *F. radicans*, Desf. A hort. plant of unknown origin, of trailing habit and useful for vases and hanging-baskets, particularly the var. with foliage variegated creamy-white; young growth closely pubescent: lvs. oblong-lanceolate, acuminate, about 2 in. long, base rounded or slightly notched and overlapping, margin entire, glabrous except perhaps along the veins, petiole about  $\frac{1}{4}$  in. long, stipules awl-like and nearly or quite as long as petiole.

20. *F. pumila*, L. CREEPING FIG. Polymorphous, young parts lightly hairy: in greenhouses it is common in the creeping stage, rooting flat to walls, under the name *F. repens*, with cordate-ovate veiny lvs. 1 in. or less long, the base oblique, petiole almost none: in the fruiting stage the branches are stiff and erect, bearing much larger thick longer-petioled lvs. that are 2-4 in. long, elliptic to oblong-elliptic, slightly or not at all cordate, nearly or quite obtuse at apex, margins entire: fr. large, pyriform or obovoid, short-peduncled, axillary, 2 in. long.—Var. *minima*, Bailey, is a very small slender form of the creeping stage, lvs. thinner, about  $\frac{1}{2}$  in. long. Japan, China, Australia; common in the open in the southern parts of the U. S. and S.

21. *F. falcata*, Miq. Creeping rooting plant with slender brown lightly hairy sts.: lvs. thick, oblong and more or less angled or rhomboidal,  $\frac{1}{2}$ -1 in. long, not tapering at base, the midrib near one side, very obtuse, much lighter colored beneath, very short-petioled and with small very sharp stipules: fr. single or in fascicles, ovoid to pyriform, about  $\frac{1}{2}$  in. long, brown to orange. Malaya; perhaps a form of *F. punctata*, Thunb.

6. *CANNABIS*, L. Strong-smelling stout erect annual herbs, in the temp. parts of Asia, regarded as a single species, widely grown for fiber.—Dioecious, rarely monoecious; fls. regular, the staminate in long-panicled racemes, the pistillate in short leafy axillary glomerules or spikes; stamens 5, drooping, sepals free; pistillate fl. in the axil of a small inclosing bract, the inconspicuous calyx closely adherent to the long ovary, stigmas 2, caducous: fr. a somewhat compressed seed-like achene, held in the persistent bract. (Can-nabis: the ancient Greek and Latin name.)

*C. sativa*, L. (*C. gigantea*, Hort., a robust form). HEMP. Leafy rough-puberulent herb, branched or nearly simple, 3-12 ft.: lvs. alternate, thin, long-petioled, the blade digitate with 3-7 long lanceolate or linear-lanceolate large-toothed long-acuminate lfts.—Grown sometimes for ornament as well as cordage, also naturalized.

7. *HUMULUS*, L. HOP. Three species of rough-stemmed twining annuals and perennials in north temp. zone, grown for ornament, and also for the hops.—Lvs. opposite: dioecious; staminate fls. in paniced tassel-like racemes, with 5-parted calyx and 5 erect stamens; pistillate fls. 2 together under large imbricating persistent bracts in a spike that at maturity may form a cone-like body or "hop," each fl. with an entire calyx that embraces the ovary and 2 caducous stigmas: fr. an achene in the enlarged tight calyx. (Hu-mulus: late Latin name of uncertain derivation.)

Lvs. deeply 5-7-lobed: pistillate catkins (hops) not greatly enlarging in fr.; the bracts narrow and acuminate: grown for ornament.....1. *H. japonicus*

Lvs. mostly 3-lobed: pistillate catkins much enlarging, becoming cone-like, the scales broad and obtuse or only short-acute: grown mostly for the hops.

Lobes of lf. short at apex and often nearly obtuse, coarsely toothed...2. *H. Lupulus*

Lobes attenuate to apex, finely toothed.....3. *H. americanus*

1. *H. japonicus*, Sieb. & Zucc. JAPANESE HOP. Grown as an annual from Japan and China, also more or less spontaneous in this country: rapid-growing tall twiner: lvs. 5-7-lobed mostly much beyond the middle, coarsely serrate, petiole mostly equaling or exceeding the blade, very rough above, less rough and often pubescent

beneath: staminate fls. small, in long narrow open panicles (6-10 in. long) with long-peduncled parts; fruiting spikes nearly globular, few-fld., not much enlarging at maturity, the scales narrow and long-acuminate and not covering the achenes, ciliate on margins and not resinous-dotted, remaining nearly or quite green.

2. *H. Lupulus*, L. EUROPEAN HOP. Native in Eu. and Asia, and escaped from cult. in N. Amer.: lvs. mostly 3-, sometimes 5- or even 7-lobed, to the middle or a little more, or often less deeply, the points abrupt and short or often obtuse, terminal lobe broad (breadth about equal to length and the base broader), those in the infl. often not lobed, margins coarsely serrate or dentate, very rough above but little rough beneath and with rather sparse glands beneath, petiole usually not exceeding and often not equaling the blade: staminate fls. in less diffuse panicles than in No. 1 and with shorter-peduncled parts, the anthers with usually less than 10 glands, the perianth with few or no glands; fruiting spikes oblong, 1-2 in. long at maturity, the thin light-colored scales then large and nearly or quite obtuse and covering the achene, finely resinous-dotted and little or not at all ciliate. (*Lupulus*, diminutive of *lupus*, wolf; the plant was called *lupus salictarius* by Pliny, the "willow wolf," because it clings tenaciously to willows and osiers.)—The common hop of hop-yards; also sometimes grown for ornament and screens. There are yellow-leaved forms (var. *aureus*).

3. *H. americanus*, Nutt. AMERICAN HOP. The native American hop, and apparently yielding hop-yard vars., as the "Oregon Cluster": lobes of lvs. often 5-11, attenuate at apex and more finely serrate, the terminal lobe narrow (breadth about one-half the length), the stipules often reflexed, glands on under surface more numerous; secondary parts of staminate panicle more open, the pedicels usually curved at right angles beneath the fl., the glands on anthers commonly more than 10, the perianth conspicuously glandular; hop with a stronger odor, the scales probably more acuminate.

#### 42. URTICACEÆ. NETTLE FAMILY

Upwards of 40 genera and about 500 species are recognized in many parts of the world, chiefly trop.; a very few are grown for ornament and fiber.—Herbs, shrubs, and trees, some of them annuals and a few climbers, often bearing stinging hairs: lvs. alternate or opposite, simple: fls. bisexual or unisexual (the latter in ours), small and mostly inconspicuous, variously disposed in cymes, small clusters or rarely on a fleshy receptacle; staminate fl. mostly with a 4-5-parted calyx, the lobes sometimes bearing appendages, the stamens usually of same number as lobes; pistillate fls. with tubular or 3-5-parted calyx, the ovary solitary, 1-celled and 1-ovuled, stigma single but various: fr. a small achene, more or less invested by the enlarging dry or succulent calyx.

Fls. in axillary little clusters or in spikes: lvs. opposite or alternate, very small, medium or large: mostly erect.

Calyx of fertile fl. tubular or cup-shaped: fl.-clusters spicate, prominent. 1. *BOEHMERIA*

Calyx of fertile fl. parted nearly or quite to the base: fl.-clusters little cymes (in ours)..... 2. *PILEA*

Fls. solitary in axils: lvs. alternate, less than ½ in. across: very slender trailer..... 3. *HELIXINE*

1. *BOEHMERIA*, Jacq. More than 50 species of herbs, shrubs and trees, mostly native in warm regions; one is an important fiber plant.—Lvs. opposite or alternate: diœcious or monœcious, the fls. in globose or elongated clusters or spikes; staminate fls. with 3-5-parted calyx and as many stamens; pistillate fls. with tubular 2-4-toothed calyx, usually contracted at top, persistent and inclosing the achene as a dry envelope; style long and slender, hairy or papillose on one side. (*Boehmeria*: Georg Rudolph Böhmer, 1723-1803, was a German botanist.)

*B. nivea*, Gaud. RAMIE. CHINESE SILK PLANT. An important fiber plant in trop. and subtrop. countries, native in China, Japan, and Malayan Isls., sometimes grown in the warmer parts of this country; also ornamental because of the felt-white under surfaces of the broad-ovate abruptly acuminate coarsely toothed long-petioled alternate lvs.: erect-branched shrub or herb, 3-6 ft. or more: fls. small, in axillary panicles shorter than the petioles; monœcious, the staminate fls. in lower part of infl.

2. **PILEA**, Lindl. About 200 annual and perennial herbs and subshrubs in many countries, mostly in warm regions, a very few grown for ornament.—Lvs. opposite, petiolate, stipules connate: diœcious or monœcious, the fls. in little axillary cymes (or sometimes paniculate) that are either 1-sexed or 2-sexed; staminate fls. 2-5-parted, stamens of same number as segms.; pistillate calyx 3-parted with unequal segms. and a scale-like staminode before each, the stigma sessile, brush-like: fr. an achene somewhat invested in persistent calyx-segms. (Pi-lea: from *pileus*, the Roman felt cap, because of the calyx-covering of the achene.)

Plant erect or strongly ascending: lvs. entire.....1. *P. microphylla*

Plant extensively creeping: lvs. crenate.....2. *P. nummulariæfolia*

1. *P. microphylla*, Liebm. (*P. muscosa*, Lindl. *Adicea microphylla*, Kuntze. *P. serpyllifolia*, Hort., not Wedd.). ARTILLERY PLANT. Grown in greenhouses and in the open far S. as a border plant, its fine close foliage and habit being ornamental; the staminate fls. open forcibly in a sunny place, with an artillery-like discharge of pollen: plant much branching, 3-15 in. high, the sts. succulent and glabrous, small plants sometimes almost prostrate, annual or biennial: lvs. of two sizes, the larger ones with blade about  $\frac{1}{4}$  in. long and petiole of nearly equal length, the opposite one usually much smaller, oblong to spatulate, entire; smaller lvs. commonly much less than half the size and clustered in the axils: fls. minute on short-stalked clusters shorter than the lvs. S. Fla., trop. Amer.; variable in stature, thickness and size of lvs.

2. *P. nummulariæfolia*, Wedd. Creeping rooting perennial covering mounds in trop. and subtrop. regions and sometimes grown in hanging-baskets and vases, hairy: lvs. nearly orbicular,  $\frac{3}{4}$  in. or less across, rounded or sometimes semi-cordate at base, petioled, crenate, hairy: fl.-clusters axillary, very small. W. Indies.

3. **HELXINE**, Req. One species in Corsica and Sardinia, making a matted moss-like covering and used on rock-work and sometimes on greenhouse benches.—Lvs. alternate: monœcious; fls. minute, solitary in axils; staminate fls. with 4-parted calyx and 4 stamens, with a 3-leaved involucre; pistillate calyx tubular, 4-lobed, contracted at mouth, with 1-leaved 3-lobed involucre: achene ovoid, included in the enlarged involucre. (Helx-ine: from the Greek name of the pellitory, a related plant.)

*H. Soleirolii*, Req. Delicate little creeping sparsely-hairy plant with very many sts.: lvs. mostly less than  $\frac{1}{4}$  in. across, of different sizes, unequal-sided, nearly orbicular, very short-petioled. (Bears the name of Capt. Soleirol, collector in Corsica.)

#### 43. PROTEACEÆ. PROTEA FAMILY

Trees or shrubs, rarely perennial herbs, of 50 or more genera and about 1,000 species, native in Australia, S. Afr., trop. E. Asia and trop. S. Amer., yielding ornamental plants and one recommended for edible nuts.—Lvs. alternate or scattered, rarely opposite or verticillate, usually coriaceous, entire, toothed or variously divided, exstipulate: fls. solitary or in pairs in the axils of persistent or deciduous bracts, borne in racemes, spikes, umbels or heads, bisexual or rarely unisexual; perianth inferior, of one series (apetalous), composed of 4 sepals valvate in the bud, with tube cylindrical or dilated toward base and globular ovoid limb; stamens 4, opposite perianth-segms. and usually inserted on them; ovary 1-celled, sessile or stipitate, sometimes with hypogynous scales or annular or cupular disk at base; ovules 1 to many; style terminal, undivided, with small terminal or lateral stigma: fr. a nut, drupe, caps. or follicle; seeds often compressed and winged.

Lvs. verticillate, in 3's or 4's.....1. *MACADAMIA*

Lvs. alternate or scattered.....

Fls. diœcious, solitary in the axils of bracts.....2. *LEUCADENDRON*

Fls. bisexual, in pairs in axils of bracts which may be deciduous.....

Seed with long terminal wing: fls. (in species following) in heads, clusters or very short racemes.....3. *HAKEA*

Seed without long terminal wing: fls. (in following species) in racemes 1-6 in. long.....4. *GREVILLEA*

1. **MACADAMIA**, F. Muell. A half-dozen or more trees or tall shrubs native in Australia, one species cult. in warm countries for its nuts.—Lvs. verticillate, entire or serrate; fls. small, bisexual, pedicellate in pairs, in terminal or axillary racemes; bracts small, caducous; perianth regular or nearly so; stamens inserted a little below perianth-limb, filaments short; ovary sessile, with long straight style ovoid or clavate at end and small terminal stigma; ovules 2; hypogynous glands 4, distinct or united into cup or ring around the ovary; fr. a globular indehiscent drupe; seeds solitary and globular or 2 and hemispherical. (Macadamia: after John Macadam, M. D., Sec. Philosophical Institute, Victoria, Australia.)

**M. ternifolia**, F. Muell. QUEENSLAND NUT. Upright tree to 50 ft. high, with very dense foliage, glabrous or young branches and infl. minutely pubescent: lvs. in whorls of 3 or 4, short-petioled, glabrous and shining, oblong or lanceolate, serrate with fine or prickly teeth, from few in. to 1 ft. or more long; racemes often as long as lvs.: fr. with 2-valved leathery exocarp. Queensland, New S. Wales.

2. **LEUCADENDRON**, R. Br. Trees or shrubs native in S. Afr., of about 70 species, one of which is grown in warm countries for its silvery foliage.—Lvs. scattered, narrow or even needle-like, entire, with hardened apex, glabrous or silvery-tomentose: diœcious; fls. regular, solitary in axils of bracts; staminate fls. numerous, in terminal sessile heads, sometimes involucre, the perianth-segms. separated to middle or beyond, the anthers sessile at base of perianth-limb; pistillate fls. subtended by woody bracts and aggregated into cone-like heads, with linear staminodia, slender terminal style and solitary ovule; fr. a broad nut. (Leucadendron: Greek for *white tree*.)

**L. argenteum**, R. Br. SILVER-TREE. Tree to 30 ft. high, with densely pubescent leafy branches: lvs. sessile, lanceolate, 3–6 in. long, densely pubescent on both surfaces with silvery silky hairs: involucre spreading, longer than the globular head of fls.: nut oblong-obovoid, with persistent calyx and style. S. Afr.

3. **HAKEA**, Schrad. About 100 species of evergreen shrubs native in Australia, many planted for ornament in warm countries.—Lvs. alternate, of diversified shape: fls. bisexual, irregular or rarely regular, in pairs in the axils of deciduous bracts, crowded in close axillary racemes or globose clusters; perianth-tube slender, usually recurved beneath the limb, which is mostly globose, the 4 lobes cohering long after the tube has opened; anthers sessile at the base of the concave perianth-lobes; ovary stipitate, 2-ovuled; style long or short, dilated at end: fr. a hard woody caps. opening in 2 valves; seeds 2, compressed, with long terminal wings which are sometimes continued down the sides. (Hakea: after Baron von Hake, German friend of botany.)

Lvs. flat,  $\frac{1}{4}$  in. or more wide.

Margins of lvs. flat, entire.

Fls. white: lvs. pinnately-veined.....1. *H. saligna*

Fls. crimson: lvs. parallel-veined.....2. *H. laurina*

Margins of lvs. wavy.....3. *H. elliptica*

Lvs. terete, needle-like.

Lf. pinnately parted.....4. *H. suaveolens*

Lf. entire.

Perianth glabrous.....5. *H. gibbosa*

Perianth pubescent.....6. *H. pugioniformis*

1. **H. saligna**, Knight. A pale or grayish shrub to 8 ft. high, glabrous except the young shoots: lvs. short-petioled, oblong or lanceolate, 3–6 in. long,  $\frac{1}{4}$  in. or more wide, obtuse but usually with callus tip, obscurely pinnately-veined: fls. white, in small dense sessile clusters: caps. about 1 in. long, rough or covered with tubercles, with short incurved beak. Queensland, New S. Wales.

2. **H. laurina**, R. Br. SEA URCHIN. Tall tree-like shrub attaining 30 ft.: lvs. lanceolate or narrowly elliptic, 5–6 in. long,  $\frac{1}{2}$ –1 in. wide, tapering to a petiole, with 3–7 prominent nearly parallel veins: fls. crimson, in dense globular sessile clusters, the globular rachis densely villous; styles golden-yellow, projecting nearly 1 in.: caps. ovoid, about  $1\frac{1}{4}$  in. long, short-beaked, nearly smooth. W. Australia.



3. *H. elliptica*, R. Br. A compact erect shrub to 10 ft. and more high; young twigs and lvs. rich bronze color due to the rusty pubescence: lvs. sessile or nearly so, oval or elliptic, 2-4 in. long, 1-2 in. wide, wavy or undulate on margins, with 5-7 prominent parallel veins connected by cross-veinlets: fls. white, in sessile globose clusters: caps. ovoid, 1-1¼ in. long with oblique beak. W. Australia.

4. *H. suaveolens*, R. Br. (*H. pectinata*, Colla). Dense rounded shrub to 10 ft. or more: lvs. terete, spiny-tipped, usually branched into few or many rigid terete lobes of unequal length: fls. white, fragrant, in dense short racemes; pedicels and perianth glabrous: caps. ovoid, about 1 in. long, glabrous but corrugated, with small incurved beak. W. Australia.

5. *H. gibbosa*, Cav. Spreading shrub to 10 ft., twigs and young branches hirsute: lvs. terete, entire, rigid, with spiny tips, 1-3 in. long: fls. white, in sessile clusters; pedicels densely pubescent but corolla glabrous: fr. ovoid, oblique, about 1½ in. long, nearly 1 in. broad, abruptly narrowed to short oblique beak. New S. Wales.

6. *H. pugioniformis*, Cav. Very similar to *H. gibbosa* but differing in its pubescent corolla, more slender lanceolate acuminate caps. which is about 1 in. long and ¼ in. broad, rough around the middle with an obliquely transverse prominent crest. New S. Wales, Victoria, Tasmania.

4. GREVILLEA, R. Br. Trees or shrubs, of perhaps 200 species mostly native in Australia, several of which are grown out-of-doors in warm countries and *G. robusta* also as a pot-plant farther N.—Very closely allied to *Hakea* from which it is not distinct in any one organ, but differs in the seed being bordered all around by a membranaceous wing or narrowly winged at the end or outer margin only or wingless, and the infl. being prevailingly terminal and often showy. (Grevil-lea: after Charles F. Greville, once vice-president of the Royal Society of England, and a patron of botany in the early part of the 19th century.)

Foliage small and heath-like, with numerous filiform divisions. . . . . 1. *G. Thelemanniana*  
Foliage not small and heath-like.

Racemes usually secund.

Lvs. 2-pinnatifid . . . . . 2. *G. robusta*

Lvs. pinnate or deeply pinnatifid. . . . . 3. *G. Banksii*

Racemes cylindrical. . . . . 4. *G. Hilliana*

1. *G. Thelemanniana*, Hueg. Spreading shrub to 5 ft. high: lvs. pale or glaucous, heath-like, 1-2 in. long, divided into numerous terete slender linear pinnae, the lower pinnae usually again divided: fls. pink with green tips, in terminal dense secund racemes 1½ in. or less long; style about twice as long as perianth; ovary glabrous, on a long stipe: fr. smooth, about ½ in. long. (Presumably named for C. Thelemann, 1811-1889, a German.) S. and W. Australia.

2. *G. robusta*, Cunn. SILK-OAK. A robust tree sometimes attaining 150 ft., but known in the N. only as a greenhouse plant 2-5 ft. high; young branches hoary or rusty-tomentose: lvs. 2-pinnatifid, the secondary lobes entire or again lobed, lanceolate, the margins recurved: fls. orange, in secund racemes 3-4 in. long which are solitary or several together on short leafless branches of the old wood; ovary glabrous, stipitate; style long: fr. broad, very oblique, about ¾ in. long. Queensland, New S. Wales; the juvenile plant is extensively grown in pots for decoration. —There is a var. with silvery foliage and deep bright red fls., and others of compact and pyramidal habit.

3. *G. Banksii*, R. Br. Tall shrub or slender tree to 20 ft. high, the branches and infl. rusty-tomentose: lvs. pinnate or deeply pinnatifid, the segms. 3-11 and broad-linear or lanceolate, silky beneath, margins revolute: fls. red, in dense erect secund racemes 2-4 in. long which are solitary or 2 or 3 together on a terminal leafless peduncle; ovary sessile, densely villous; style very long: fr. obliquely ovate, villous, 1 in. or less long. (After Sir Joseph Banks, 1743-1820, famous English scientist.) Queensland.

4. *G. Hilliana*, F. Muell. A large tree with young branches minutely tomentose: lvs. 6-10 in. or more long, sometimes entire and obovate-oblong or elliptical and very obtuse, or deeply divided at end into 2 or 3 diverging lobes, or deeply pinnatifid into 5-7 oblong or lanceolate lobes: fls. red (pink or white in some forms), small and numerous, in dense cylindrical racemes 4-8 in. long; ovary glabrous, stipitate; style long and slender: fr. slightly compressed, nearly 1 in. long. (Bears the name of its discoverer, Walter Hill, Director of the Botanic Gardens of Brisbane.) Queensland.

## 44. ARISTOLOCHIACEÆ. BIRTHWORT FAMILY

Herbs or woody plants, the latter usually climbing, of 5 genera and about 200 species, distributed in warm regions, most numerous in S. Amer.—Lvs. alternate, petiolate, often cordate, entire or 3–5-lobed: fls. medium or large, rarely small, lurid greenish-yellow, purple or variegated, often carrion-scented, bisexual, epigynous; perianth (calyx) simple, usually 3-lobed, petaloid, very diverse; petals 0 in ours; stamens 6–36, free and inserted on the ovary or united with the style; ovary inferior, rarely superior, 4–6-celled (rarely 5), ovules many; styles united into column, stigmas 4–6: fr. a caps.

**ARISTOLOCHIA**, L. BIRTHWORT. About 180 species, two of which are rather commonly grown in greenhouses and one, *A. macrophylla*, as a porch vine.—Herbs with perennial rhizomes, woody climbers, rarely arborescent: fls. irregular and of many forms, axillary, solitary, fascicled or in short racemes; perianth tubular, variously bent; stamens usually 6, placed in a row about the style and united with it; ovary inferior, 6-celled (rarely 5 or 4). (Aristolochia: Greek, referring to medicinal qualities.)

- |  |                          |
|--|--------------------------|
| Limb 6 in. or more across, with long tails. .... | 1. <i>A. grandiflora</i> |
| Limb about 3 in. across, entire. ....            | 2. <i>A. elegans</i>     |
| Limb about 1 in. across, 3-lobed. ....           | 3. <i>A. macrophylla</i> |

1. *A. grandiflora*, Sw. (*A. gigas*, Lindl.). PELICAN-FLOWER. Climbing shrub, becoming glabrous: lvs. cordate-acuminate: peduncles solitary, bracteate, exceeding the petiole; tube of perianth inflated, contracted in middle, yellowish-green: limb greatly expanded, several in. across, cordate-ovate, wavy margined, with long slender tail, blotched and veined with purple. Jamaica. —Var. *Sturtevanti*, W. Wats., is the commonest form in cult., having very large fls. and a tail sometimes 3 ft. long; it was brought prominently to notice by E. D. Sturtevant, Bordentown, N. J., later of Calif.

2. *A. elegans*, Mast. CALICO-FLOWER. Slender glabrous climber; flowering branches pendulous, filiform: lvs. long-petioled, broadly reniform-cordate, 2–3 in. long, basal lobes rounded, tip rounded or obtuse; stipules falcately reniform or almost orbicular: fls. solitary, long-pedicelled, borne on young shoots; perianth-tube  $1\frac{1}{2}$  in. long, rather inflated, pale yellow-green, limb nearly circular, shallow, cordate at base, 3 in. diam., on outside white with red-purple veining, inside rich purple-brown. Brazil.

3. *A. macrophylla*, Lam. (*A. Sipho*, L'Her.). DUTCHMANS PIPE. PIPE-VINE. Tall, twining, nearly glabrous: lvs. 6–15 in. broad when mature, broadly reniform or rounded, becoming glabrous: peduncles solitary or 2–3 together in the axils, with large clasping bract: fls. U-shaped, inflated above the ovary, greenish-yellow, with 3-lobed spreading flat brown-purple limb about 1 in. across: caps. oblong-cylindric, 2–3 in. long, strongly parallel-nerved. E. U. S.

## 45. POLYGONACEÆ. BUCKWHEAT or KNOTWEED FAMILY

Herbs, shrubs, and trees, erect or climbing, of 30–40 genera and probably 800 species, widely distributed in both cold and warm countries; several species are grown for ornament and a few for food products.—Sts. jointed: lvs. simple, alternate, opposite or whorled, stipules commonly forming a sheath or ocrea: fls. small, unisexual or bisexual, mostly the latter, plants sometimes monœcious or dioecious; infl. spicate, racemose, paniculate, or otherwise, often becoming showy by the mass of little fls.; perianth of 1 or 2 series, more or less persistent, petals absent, the parts 2–6-cleft or parted, or sometimes distinct and sometimes developing wings, protuberances or spines; stamens 2–9, rarely more, mostly separate and opposite the perianth parts; pistil solitary and superior, mostly 1-celled but of 2–4 carpels; style 2–4-cleft: fr. usually a lenticular or angled achene, sometimes inclosed in the enlarging perianth which forms a berry-like body. C, D, Fig. 9, page 258.

Fr. dry, more or less inclosed in the persistent often much-enlarged perianth which (in our species) does not become fleshy: herbaceous or essentially so, at least in cult. kinds, sometimes producing woody annual canes.

Plants erect, or if climbing not tendril-bearing.

Perianth-parts 5 (rarely 4), erect in fr. and equal, not much enlarging.

Achene little if at all exceeding perianth: cult. for ornament. . . . . 1. *POLYGONUM*

Achene much exceeding perianth: grown for the food grain. . . . . 2. *FAGOPYRUM*

Perianth-parts 6 or more, inner ones erect, outer ones reflexed, the inner ones sometimes much larger.

Sheaths (ocreae) large and prominent: stamens mostly 8-10:

stout large herbs with abundant very broad radical lvs. . . . . 3. *RHEUM*

Sheaths not prominent or soon falling away: stamens 6: weedy herbs. . . . . 4. *RUMEX*

Plants climbing by means of tendrils. . . . . 5. *ANTIGONON*

Fr. fleshy and more or less berry-like (i.e. the achene imbedded in the enlarged perianth which becomes thickened): woody, erect or climbing.

Perianth-parts separated nearly to base: vines or shrubs with flattened branches. . . . . 6. *MUEHLENBECKIA*

Perianth more or less shallowly lobed: shrubs and trees. . . . . 7. *COCCOLOBIS*

1. *POLYGONUM*, L. KNOTWEED. Species about 200 if the genus is accepted broadly, widely spread over the earth from frigid to warm climates, several grown for ornament and interest.—Annual and perennial herbs (some of them common weeds, as the smartweeds), a few more or less woody, erect or climbers, sometimes aquatic and with floating lvs.: sts. usually manifestly jointed: lvs. various, almost linear, lanceolate, to broad-ovate and hastate, simple and entire, sheaths or ocreae usually well developed: fls. small but often showy because of the numbers and the bright colors of perianth, on short jointed pedicels mostly in racemes, spikes or heads; perianth mostly 5-parted, often pink or red, the parts erect and all alike in fr.; stamens 3-9, exserted or included; style 2-3-parted, the stigmas capitate: achene small, lenticular or triangular, nearly or quite covered by the persisting perianth; embryo on one side of albumen. (*Polyg-onum*: Greek *many-kneed*, from the jointed sts.)

\* Plant erect or spreading.

Fls. in conspicuous terminal peduncled spikes, pink, red, or clear white: grown primarily for the bloom.

Lvs. cauline, large and broad, broad-ovate: annual. . . . . 1. *P. orientale*

Lvs. cauline, long and narrow, mostly lanceolate: perennial. . . . . 2. *P. alpinum*

Lvs. mostly radical, ovate-lanceolate or narrower: perennial. . . . . 3. *P. affine*

Fls. in axillary clusters, greenish or whitish: grown primarily for the heavy foliage.

Lvs. truncate at base. . . . . 4. *P. Sieboldi*

Lvs. shallow-cordate at base. . . . . 5. *P. sachalinense*

Plant tall-twining.

Fls. small, greenish or very pale in color; infl. mostly erect. . . . . 6. *P. Auberti*

Fls. larger,  $\frac{1}{4}$  in. or more across, bright rose; infl. mostly drooping. 7. *P. baldschuanicum*

1. *P. orientale*, L. PRINCES-FEATHER. Vigorous much-branched hairy annual, 4-6 ft. (but dwarfier races, 18-30 in. high, are in cult.): lvs. large, blade 4-10 in. long on lower parts, broad-ovate or somewhat narrower above, sometimes subcordate, acuminate-pointed; sheaths prominent, ciliate, sometimes with a spreading or reflexed border: fls. attractive, bright pink or rose-pink, in many dense long-peduncled cylindrical spikes 1-3½ in. long, more or less curved or nodding; stamens usually 7, somewhat exserted. Asia, Australia; sometimes spontaneous.

2. *P. alpinum*, All. Stout, branching, 2-3 ft. or more, with glabrous sts. and short ciliate sheaths: lvs. lanceolate to ovate-lanceolate, 4-6 in. long, very long-acuminate, thinly hairy beneath and ciliate on margins: fls. numerous, snow-white, in many paniced racemes, in summer; sepals blunt; stigmas 3. Alps, and Asia; has been cult. as *P. sericeum* (not *P. sericeum*, Pall.).

3. *P. affine*, D. Don (*P. Brunonis*, Wall). Tufted glabrous perennial from long strong rootstocks, 12-18 in. high; sts. simple or forked: lvs. mostly radical, oblanceolate, tapering to petiole, obtuse or only short-acute, finely serrate; sheaths brown, long-produced opposite the lvs., lower ones split and frayed: fls. bright rose-red, in erect dense obtuse spikes 2-3 in. long, appearing in autumn; stamens 8: achene 3-sided. High Himalayas.

4. *P. Sieboldi*, DeVriese (*P. cuspidatum*, Sieb. & Zucc., not Willd. *P. Zuccarini*, Small. *Pleuropterus Zuccarini*, Small). Persistent stout perennial 4-8 ft. high, forming large clumps, with long underground rhizomes; sts. simple or little branched, glabrous: lvs. short-oval to orbicular-ovate, abruptly pointed, with an abrupt or truncate base, petiole about 1 in. long; sheaths short, deciduous: fls. small and greenish-white, pedicelled, numerous in slender axillary panicle racemes that usually do not equal or exceed the lvs., late summer and autumn; stamens 8: achene 3-sided in a broadly winged calyx. (For von Siebold, page 87.) Japan; now common in yards, and also somewhat escaped.—Var. *compactum*, Bailey (*P. compactum*, Hook. f.), is a closer-growing form about 2 ft. tall.

5. *P. sachalinense*, F. Schmidt. SACALINE. Larger than No. 4, very robust and spreading rapidly, 8-12 ft.: lvs. very large, the blades sometimes 1 ft. and more long, oval-oblong, shallowly cordate at base, not manifestly acuminate-pointed: fls. greenish, in rather short and close axillary clusters; stamens 8: achene 3-sided. Saghalin Isl.; recommended sometimes as a forage plant.

6. *P. Auberti*, L. Henry. Tall vigorous hardy perennial vine, twining, glabrous, 20 ft. or more: lvs. bronzy-red when young, ovate-lanceolate, slender-petioled, blade  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, thin, varying from pointed to nearly obtuse, at base mostly shallowly cordate, more or less shining, entire but more or less undulate: fls. small, less than  $\frac{1}{4}$  in. across at full expansion, greenish, in long slender erect racemes that are branched or combined into a very open panicle, fragrant: fr. not setting freely, winged, whitish with brown bands. (Bears the name of Georges Aubert, missionary in Tibet.) W. China, Tibet.

7. *P. baldschuanicum*, Regel. Differs in its larger fls., which are  $\frac{1}{4}$  in. or more across and rose-colored, borne in denser drooping panicles, and larger frs. which are usually borne in profusion. (Bears the geographical name Baldschuan.) Bokhara; it is to be determined whether stock bearing this name is not No. 6.

2. **FAGOPYRUM**, Gaertn. BUCKWHEAT. About a half-dozen annual or perennial soft-stemmed herbs of Eu. and Asia distinguished technically from Polygonum by the achene prominently projecting beyond the persisting old perianth, and the embryo contained within the albumen: quick-growing usually glabrous plants with alternate deltoid or hastate more or less angle-lobed lvs., and small white fls. in racemes or rather dense corymbs; stamens 8, included or only slightly exerted; styles 3, stigmas capitate: fr. a triangular-pointed achene. (Fagopy-rum: Greek *beech wheat*, from the likeness of the achene to a small beech-nut; *buckwheat* is of similar significance: German *buche*, beech.)—The genus is sometimes limited to the 2 following annual species.

Racemes slender and open, from axils along the st., not aggregated at summit: fr. with obtuse often corrugated angles.....1. *F. tataricum*  
 Racemes short and dense, mostly aggregated into dense clusters: fr. with sharp continuous angles.....2. *F. esculentum*

1. *F. tataricum*, Gaertn. INDIA-WHEAT. Slender plant,  $1\frac{1}{2}$ -2 ft.: st.-lvs. rather small, blade 1-2 in. long and breadth often greater than length, broadly halberd-shaped with wide-spreading basal lobes mostly acute, petiole very slender: racemes remote in the axils, loosely fld., not aggregated; fls. small, greenish or yellowish: fr. with rounded or obtuse often wavy or corrugated angles, and a sulcus or groove between, oblong-pointed rather than triangular in form, gray. India; sometimes grown for the grain, and also escaped; known also as Tartarian, Iceland, Rye buckwheat, and as Duck-wheat.

2. *F. esculentum*, Gaertn. COMMON BUCKWHEAT. A stouter plant than No. 1: lvs. mostly larger and stronger-petioled, triangular-ovate, manifestly pointed, the basal lobes mostly acute: fls. much larger, white and fragrant, with honey-bearing glands, in short and dense racemes or clusters mostly at or near the summit of the plant: fr. larger, with sharp continuous angles and flat or not grooved sides, distinctly triangular, mostly bright brown. Probably Cent. or N. Asia; much cult. and sometimes spontaneous; the Silver Hull, Japanese, and other buckwheats belong here.

3. **RHEUM**, L. Stout herbs of Asia, probably 25 species, with clumps of large radical lvs. and erect towering fl.-sts., one grown in the vegetable-garden and others sometimes for ornament.—Lvs. broad and large, entire or divided;



sheaths long and prominent: fls. bisexual, greenish or whitish, small but numerous, pedicelled, in paniced fascicles or racemes, the perianth not much enlarging in fr. and the outer parts reflexed; perianth 6-parted and open or spreading; stamens mostly 9, sometimes as few as 6; styles 3: achene becoming strongly winged. (Rhe-um: from *rha*, the old Greek word for rhubarb.)

Radical lvs. entire.....1. *R. Rhaponticum*  
Radical lvs. deeply lobed.....2. *R. palmatum*

1. *R. Rhaponticum*, L. GARDEN RHUBARB (sometimes called Pie-Plant and Wine-Plant), grown for the thick edible petioles of radical lvs., cooked and eaten in spring: roots large, fleshy: lvs. mostly radical, cordate-ovate and entire, the blade 12-18 in. or more long: sts. 4-6 ft., strict but more or less branching, hollow: fls. greenish-white, on slender jointed pedicels: fr. cordate-ovate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, winged. Siberia.—The specific name *Rhaponticum* (the Pontic Rha or rhubarb) is used tentatively; the common rhubarb is very likely a race of hybrids or variants.

2. *R. palmatum*, L. Grown for the bold effect of its foliage: radical lvs. broadly cordate or nearly orbicular, deeply palmately lobed, the lobes entire, dentate or pinnatifid: st. 5-6 ft., the panicle leafy and branches pubescent, pedicels short. N. E. Asia.—Var. *tanguticum*, Regel, has longer lvs. that are not so deeply lobed. The form known as *atrosanguineum* has a dark red panicle.

4. RUMEX, L. DOCK. SORREL. Weedy herbs, mostly perennial, a few grown for greens; species 125 or more, of wide distribution in temp. regions.—Sts. mostly leafy, in some species the lvs. radical, usually erect, more or less branched: lvs. various, sometimes hastate, mostly entire, in some species undulate; sheaths usually breaking up and falling away early: fls. bisexual or unisexual (plants sometimes dioecious), on jointed pedicels, green, the perianth deeply 6-parted, the 3 outer parts remaining small and becoming reflexed, the 3 inner enlarging and winged and 1 or all of them (called "valves") bearing a tubercle or grain at the center or base. (Ru-mex: the Latin name.)—The following species are perennial.

Lvs., some or all, hastate, sour: fls. unisexual: sorrels.

Valves bearing tubercles or callosities at base.

Plant slender, 2-3 ft. in flower.....1. *R. Acetosa*

Plant large, 5-9 ft.....2. *R. abyssinicus*

Valves not tubercle-bearing.....3. *R. scutatus*

Lvs. not hastate, and usually not sour: fls. mostly bisexual.

Valves (1 or more) bearing tubercles.....4. *R. Patientia*

Valves not with tubercles.....5. *R. hymenosepalus*

1. *R. Acetosa*, L. GARDEN SORREL. Lvs. thin, light green, long-petioled, mostly oblong or oblong-oval in outline, obtuse or short-acute at apex, spear-lobed at base, margins entire and more or less undulate: panicle erect and crowded, standing 2-3 ft. above ground: valves rounded, about  $\frac{1}{8}$  in. long, very veiny, nearly or quite entire, cordate with a callosity or swelling below. (Acetosa is a pre-Linnaean generic or substantive name, from the acetose character of the plants.) Eu. and Asia, and sparingly naturalized in this country; grown somewhat for the radical lvs. used as spring greens, Large Belleville being one cultivar.

2. *R. abyssinicus*, Jacq. SPINACH-RHUBARB. Robust perennial, the fl.-sts. rising 5-9 ft. high: lower lvs. broad-ovate or somewhat 3-lobed-triangular hastate-cordate, acuminate, petiolate, entire; st.-lvs. sagittate or long-lanceolate, 3-7 in. long, the profuse panicle leafless in the top: fls. on articulated pedicels; valves oval to nearly orbicular, cordate,  $\frac{1}{4}$  in. or less long, lightly reticulated, with minute callosities at base. Abyssinia; introduced by U. S. Dept. of Agriculture as a kitchen-garden vegetable, the lvs. said to be eaten as spinach and the stalks as rhubarb.

3. *R. scutatus*, L. FRENCH SORREL. A low glaucous plant with many branching prostrate or ascending sts., sometimes grown for greens: lvs. somewhat fleshy, cordate-ovate, obtuse, those of the st. hastate-panduriform, sometimes more or less lobed: valves thin, cordate, without callosities. Eu., Asia.

4. *R. Patientia*, L. SPINACH-DOCK. HERB PATIENCE. Very stout, 5-6 ft. with a deep strong tap-root: lvs. elliptic-ovate, 1 ft. or more long and long-petioled the upper st.-lvs. long-lanceolate and short-stalked or nearly sessile: infl. sometimes 2 ft. long, very heavy, dense in fr.: valves cordate, about  $\frac{1}{4}$  in. across, very veiny,

entire or wavy-margined, one of them with a small tubercle or swelling near base. Eu., grown for early greens; naturalized in N. Amer.

5. *R. hymenosepalus*, Torr. CANAIGRE. St. erect, 2-3 ft., nearly simple, from a fascicle of spindle-shaped tubers (which produce tannin for which the plant is sometimes cult.): lvs. oblong to oblong-lanceolate, sometimes 1 ft. long, narrowed either way, somewhat undulate, short-petioled; sheaths prominent: panicle 6-12 in. long; fls. bisexual, large: valves large,  $\frac{1}{2}$  in. or more across at maturity, veiny and entire, rose-colored, without tubercles. Okla. to Calif.

5. *ANTIGONON*, Endl. Three or 4 tendril-climbing vines of Mex. and Cent. Amer., one widely planted for ornament in warm and trop. countries.—St. slender: lvs. alternate, cordate to hastate, entire, petioled: fls. in racemes that terminate in a tendril; perianth of 5 parts, the 2 or 3 outer ones cordate or ovate and the inner ones oblong, all parts colored and showy; stamens 8; styles 3: achene large, 3-angled, at least above, loosely covered in the enlarging papery perianth-parts. (Antig-onon: Greek, perhaps referring to jointed character of fl.-sts.)

*A. leptopus*, Hook. & Arn. CORAL-VINE. CORALLITA. Attractive robust vine with slender racemes from the axils of cordate-ovate or hastate-ovate or triangular very veiny acuminate lvs. 1-3 in. long, the lower lvs. much larger: fls. bright pink, enlarging to  $\frac{3}{8}$  in. long: achene conical, sharply 3-angled above, about  $\frac{3}{8}$  in. long, much exceeded by the veiny persistent enlarged perianth. Mex.—Frequently white-flid.; the name white corallita is sometimes applied improperly to *Porana*. Grown in southern states and Calif. and in tropics under several names.

6. *MUEHLENBECKIA*, Meissn. (*Calacinum*, Raf.). More or less woody, erect or climbing, including species of widely different looks and habit, grown for ornament; species about 15, in southern temp. zone.—Lvs. alternate, with short sheathing stipules, or sometimes wanting: fls. unisexual, the plants polygamous or dioecious, small and not showy, fascicled in the axils or in short spikes or racemes; perianth deeply 5-parted, the outer parts becoming succulent; stamens commonly 8; styles 3 or wanting: achene ovoid, 3-angled, inclosed in fleshy perianth, forming a berry-like body. (Muehlenbeck-ia: H. G. Muehlenbeck, a physician in Alsace, 1798—about 1845.)

Plant twining or vine-like.

Lvs. nearly or quite orbicular in outline, about  $\frac{1}{2}$  in. or less across. . . . 1. *M. complexa*

Lvs. oblong or ovate, hastate at base. . . . 2. *M. chilense*

Plant erect, with flattened branches. . . . 3. *M. platyclados*

1. *M. complexa*, Meissn. WIRE-PLANT. A tall climber on chimneys and elsewhere in Calif., and also grown in greenhouses and hanging-baskets, on the ground forming dense masses: dioecious: sts. slender and wiry, reddish, much branched, more or less hairy or pubescent on the young parts: lvs.  $\frac{1}{4}$ – $\frac{1}{2}$  or  $\frac{3}{4}$  in. across, nearly or quite orbicular in outline, often contracted in the middle or fiddle-shaped, or even obscurely lobed, petiolate: fls. few in axillary and terminal spikes; fruiting perianth  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam., usually succulent, waxy-white, forming a cup or urn about the achene. New Zeal.

2. *M. chilense*, Meissn. Strong twiner: lvs. thick, somewhat fleshy, oblong or ovate, hastate or triangular at base for the most part, the margin somewhat revolute: racemes axillary and terminal: achene included in the enlarged perianth or somewhat exerted. Chile and Peru; planted somewhat in Calif.

3. *M. platyclados*, Meissn. CENTIPEDE-PLANT. Erect shrub to 10 ft., with flat thin ribbon-like branches  $\frac{1}{2}$  in. or more broad, with the little fascicles of very small fls. at the joints: lvs. mostly wanting but sometimes present, lanceolate, 1 in. long more or less: fr. a deep red or purplish berry-like body formed of the perianth, containing the achene. Solomon Isls.—Grown as a curiosity.

7. *COCOLOBIS*, P. Br. (*Coccoloba*, L.). More than 125 species of shrubs and trees in the American tropics and subtropics, including the familiar sea-grape, *C. uvifera*; one is somewhat grown in glasshouses for its massive foliage.—Lvs. alternate, variable in size and shape, entire; sheaths mostly small: fls. greenish, in racemes or spikes in the axils of minute bracts, bisexual or

sometimes unisexual by abortion; perianth 5-parted, the tube enlarging and becoming succulent, inclosing the achene; stamens 8; styles 3: achene 3-angled, contained within the fleshy berry-like body. (Coccolo-bis: Greek, referring probably to the lobed perianth persisting on the fr.)

**C. pubescens**, L. (*C. grandifolia*, Jacq.). Tree to 80 ft., grown in its juvenile state as a pot subject, sparingly branched: lvs. very large,  $1\frac{1}{2}$ -2 ft. or more across, horizontal, orbicular, clasping the st. like a shield, with many side ribs, the ribs and veins outstanding below and looping at ends, closely rusty-pubescent beneath: fls. greenish, in solitary erect terminal racemes shorter than the lvs.: fr. ovate, edible. Antilles, British Guiana.

#### 46. CHENOPODIACEÆ. GOOSEFOOT FAMILY

About 75 genera and 500-600 species of wide distribution, annual and perennial herbs, some of them succulent and inhabitants of sea-shores and saline places, a few shrubby, all with small inconspicuous fls.; many of them are world-wide weeds; several species are grown for ornament and others yield garden vegetables.—Mostly unattractive often mealy or scurfy plants: lvs. usually alternate and without stipules, simple: fls. greenish, bisexual or unisexual, plants sometimes dioecious; calyx persistent, 2-5-lobed or -parted, or reduced to 1 sepal, in the pistillate fls. sometimes wanting; stamens as many as calyx-lobes and opposite them, or frequently fewer; pistil of a single 1-celled and 1-ovuled ovary superior or nearly so, styles 1-3; disk sometimes present: fr. a utricle or achene, more or less inclosed in the enlarging calyx; in some cases 2 or more fls. in the dense cluster grow together and form a multiple fr.

Fls. usually bisexual; perianths all alike on the same plant.

Lvs. (in ours) broad, mostly variously angled, toothed, or deeply lobed.

Calyx merely more or less enlarging in fr., but not changing in character: fls. without bracts, mostly in paniced spikes.....1. CHENOPODIUM

Calyx becoming hard and woody in fr., several often growing together: fls. bracted.....2. BETA

Lvs. linear or even narrower and entire, crowded.....3. KOCHIA

Fls. unisexual, the plant monoecious or dioecious; perianths (or bracts) of 2 kinds.

Stigmas 2: fr. between 2 large flat bracts.....4. ATRIPLEX

Stigmas 4 or 5: fr. inclosed in a carpel-like body formed of the bracts.....5. SPINACIA

1. **CHENOPODIUM**, L. GOOSEFOOT. PIGWEED. Weedy annual and perennial herbs, or rarely subshrubs, of about 60 species, usually mealy and often with strong odor: lvs. alternate, mostly angled and toothed, sometimes almost dissected: fls. bractless, sessile, mostly bisexual, perianth usually 5-parted; stamens 5 or less; style usually absent, the stigmas 2-5 and very slender: fr. a utricle, inclosed in the mostly dry and little modified persistent calyx. (Chenopo-dium: Greek *goose-foot*, from the shape of the lvs. of some species.)—The common pigweed or lambs quarters (*C. album*, L.) is sometimes collected for greens.

Lvs. pinnatifid-lobed: plant very strong-smelling, annual.....1. *C. Botrys*

Lvs. entire or only angled or shallowly lobed: plant not aromatic.

Lf.-margin strongly toothed: annual.....2. *C. amaranticolor*

Lf.-margin entire or essentially so: perennial.....3. *C. Bonus-Henricus*

1. **C. Botrys**, L. (*Ambrosia mexicana*, Hort.). FEATHER-GERANIUM. JERUSALEM-OAK. Much-branched glandular-pubescent annual 1-2 ft. or more high, grown for its strong aromatic odor and long profuse fine panicles and knots: lvs. oval or oblong, sinuate-lobed or pinnatifid: fls. very numerous, small, forming little heads aggregated in clumps and elongated sprays. (Botrys is the name used by old herbalists; as Greek it implies a cluster, as of grapes.) Eurasia, Afr.; also naturalized.

2. **C. amaranticolor**, Coste & Reyn. Robust much-branched annual to 8 ft., the young parts mealy but the plant otherwise glabrous, grown for the ornament

of its bright violet-red top foliage (used also for greens) and red-striped st.: lvs. large, triangular-ovate to rhomboidal, semi-truncate or tapering to petiole, irregularly strongly toothed and notched: fls. in axillary and terminal paniced spikes. Origin not known; perhaps a cultigen; escaped in some places.—(Named for the amaranthus-like color of foliage.)

3. **C. Bonus-Henricus**, L. GOOD KING HENRY (an old herbalist name, Latinized in the specific name). MERCURY. Perennial with deep dock-like root, the plant sometimes grown as a pot-herb, glabrous or nearly so: st. 1-2½ ft. high, several from a root, with weak side branches: lvs. spinach-like, triangular-hastate, slender-stalked, obtuse or only short-pointed, margins entire or obscurely sinuate: fls. in short paniced spikes, axillary and terminal. Eu.; sometimes escaped.

2. **BETA**, L. BEET. A half-dozen or so species in Eu., N. Afr., and Asia, one widely cult.—Annual, biennial, perennial, herbaceous, with alternate entire or sinuate lvs., nearly or quite glabrous: fls. greenish, sessile in long paniculate more or less open spikes, usually 2 or 3 together with minute bracts beneath the incurving 5-parted calyx; stamens 5; ovary sunk in a disk or hypanthium, the stigmas usually 3: fr. mostly aggregate, formed of the cohesion of 2 or more fls. grown together at their bases and forming a very irregular dry body (the "seed" of commerce); each seed is inclosed in a hard shell formed of the enlarging disk and calyx, the calyx forming thickened protuberances. (Be-ta: Latin name of the beet.)

**B. vulgaris**, L. BEET. BEET-ROOT of the English. SUGAR-BEETS and MANGELS are common forms. Biennial, sometimes annual, grown for the thickened root in different sizes, forms, and colors, young lvs. also eaten as greens, glabrous: st. produced the second year from the top of the tuber, 2-4 ft.: lvs. ovate to oblong-ovate, passing into linear bracts in the infl.: fls. very many, in a tall open panicle. Cultigen; presumably derivative from *B. maritima*, L. (*B. vulgaris* var. *perenne*, L.), of the coasts of Eu.—Var. **Cicla**, L., LEAF-BEET, is without fleshy root and the lvs. are much developed; in some races the foliage is highly colored and the plants are grown for ornament; in others, as Swiss Chard, the midrib is much enlarged, and plants are grown as pot-herbs. (Cicla is a geographical name, connected with Sicily.)

3. **KOCHIA**, Roth. Annual and perennial herbs, sometimes shrubby, 30-40 species mostly in the Old World, 4 in W. Amer., one grown for ornament.—Lvs. very narrow or even terete, entire: fls. bisexual or sometimes pistillate, sessile, single or in small clusters in the axils; calyx with 5 incurved lobes which in fr. develops horizontal wings; stamens 5, exserted; stigmas mostly 2: fr. a utricle, in which the seed is free from the pericarp. (Koch-ia: W. D. J. Koch, 1771-1849, German botanist, was Director of the Botanic Garden at Erlangen and author of a flora of Germany and Switzerland.)

**K. scoparia**, Schrad. SUMMER-CYPRESS. BELVEDERE. Erect much-branched lightly hairy or glabrous annual, sometimes grown for its pyramidal habit and interesting herbage: lvs. alternate, linear-acute, usually ciliate, the larger ones to 2 in. or upward long and narrowed to short petiole, the many smaller ones very narrow and without evident petiole and much exceeding the little fl.-clusters. Eu., Asia, and escaped in N. Amer.—Var. **trichophila**, Bailey (*K. scoparia* forma *trichophila*, Schinz & Thell. *K. trichophylla*, Hort.), the common form in cult., has a denser more ovoid or globular dense habit, very narrow lvs. mostly with long hairs particularly toward the base, and purple-red autumn color; planted for its formal effect.

4. **ATRIplex**, L. Annual and perennial herbs and shrubs, widely distributed, one grown as a pot-herb; species many, of which more than 100 are in N. Amer. north of the Isthmus.—Usually scurfy or canescent, often the whole plant gray, monœcious or dicecious: lvs. various, alternate or opposite, stalked or sessile: fls. usually in small clusters in the axils or terminal, rarely solitary; staminate fls. with 3-5-parted calyx and no bracts, the stamens as many as the segms.; pistillate fls. usually without calyx and with 2 bracts, the



bracts enlarging and covering the fr.; stigmas 2 and very slender: fr. a utricle, with the seed usually free. (At-riplex: Greek name of the orach.)—**A. Breweri**, Wats., native in S. Calif., is sometimes used for ornamental hedges in that region: an erect shrub with ovate-oblong silvery-gray lvs.

**A. hortensis**, L. ORACH. Tall somewhat branched nearly or quite glabrous annual with chenopodium-like lvs., grown for greens; there is a form with red foliage: monoecious: lvs. opposite and alternate, triangular-ovate to hastate, long-petioled, margins angled or dentate or sometimes nearly continuous, apex obtuse or short-acute: fls. with very short pedicels which elongate in fr., in axillary and terminal more or less paniced racemes, some of the pistillate ones naked and with 2 large bracts and others 3-5-lobed green calyx without large bracts: fr. a utricle mostly covered between the 2 large (about  $\frac{1}{3}$  in. long) oval or ovate flat bracts. Asia; sometimes escaped.

5. **SPINACIA**, L. SPINACH. Three or 4 species of annual dioecious erect herbs of S. W. Asia, one widely cult.—Lvs. alternate, usually triangular-ovate to hastate: fls. unisexual (only rarely bisexual), the pistillate usually axillary and the staminate in terminal spikes or panicles; staminate calyx 4-5-parted, stamens of equal number with lobes and exserted; pistillate fl. subtended by 2 perianth-like bracts that grow together and inclose the utricle in the tube; stigmas 4 or 5, exserted. (Spina-cia: Latin *spina*, from the spiny fr.)

**S. oleracea**, L. PRICKLY-SEEDED SPINACH or SPINAGE. Smooth and glabrous, producing in cool weather a crown of large lvs. used as a pot-herb: radical lvs. narrow-oblong or ovate-oblong, in the usual vars. broad-ovate to almost orbicular, with projecting lobes at base on either side and sometimes extra lobes on the sides; st.-lvs. smaller, becoming lanceolate in the infl.: st. simple or somewhat branched, 6 in. to 2 ft. high, glabrous: staminate fls. mostly in leafless spikes or panicles; pistillate fls. clustered in the axils: fr. a utricle inclosed in a 2-4-spined caps.-like body ("seed" of commerce) formed of the calyx-like bracts.—Var. **inermis**, Peterm., ROUND-SEEDED SPINACH, differs in having the "seed" without spines.

#### 47. AMARANTHACEÆ. AMARANTH FAMILY

Mostly weedy plants, a few grown for ornament and also for food as pot-herbs; genera about 40 and species 450-500 of wide distribution, but most abundant in warm countries.—Herbaceous, a few woody: lvs. opposite or alternate, usually simple, sometimes fleshy: fls. small and inconspicuous but the infl. often showy because of the mass and the colored perianths and subtending scales, unisexual or bisexual, plants sometimes monoecious and dioecious; perianth 2-5-parted or cleft, or the segms. sometimes distinct, the parts in one series and petals therefore lacking, parts nearly or quite equal; stamens 1-5, usually opposite the perianth-parts, sometimes united into a tube; ovary superior, style none or 1 or more: fr. various, commonly a circumscissile utricle but sometimes berry-like or an achene, usually surrounded by a persistent perianth: family marked by the scarious imbricated fl.-scales, usually 3 to each fl., and the glomerate, spicate, racemose, or paniculate dry infl.

Fr. dry, utricular, usually dehiscent: fls. in dry glomerules, spikes or panicles.

Lvs. alternate.

Filaments (of stamens) free: ovary with 1 ovule.....1. AMARANTHUS

Filaments united into tube: ovules 2 or more.....2. CELOSIA

Lvs. opposite.

Filaments subulate, nearly or quite free: fls. very small, in little clusters or spikes forming a diffuse open panicle.....3. IRESINE

Filaments united into a tube.

Infl. of small dense sessile axillary glomerules.....4. TELANTHERA

Infl. capitate on long peduncles, sometimes involucrate.....5. GOMPHRENA

Fr. a berry (at least in ours): lvs. alternate: fls. racemose.....6. DEERINGIA

1. **AMARANTHUS**, L. AMARANTH. Annual herbs, mostly of coarse appearance, about 50 species of wide distribution, some of them among the plants known as pigweeds; some of the weedy ones are more or less gathered

when young for greens and others are grown for that purpose in other countries; others are cult. for ornament.—Fls. usually not bisexual, in chaffy dense spikes and panicles, each fl. subtended mostly by 3 bracts; perianth glabrous, of 2–5 parts distinct or nearly so; stamens commonly 5, sometimes 2 or 3, separate, anthers 2-celled; stigmas 2 or 3: fr. a 1-seeded utricle, the persistent styles forming beaks. (Amaranthus, sometimes spelled Amarant-us: Greek *unfading*, in allusion to the unwithering bracts.) *E*, Fig. 9, page 258.

- Fl.-clusters small and closely glomerate in the axils even toward base of plant, as well as also in more or less elongated spikes at top of plant ..... 1. *A. tricolor*  
 Fl.-clusters all elongate and at or near top of plant, forming a terminal panicle.  
 Panicle or its branches (particularly the terminal) drooping..... 2. *A. caudatus*  
 Panicle and branches erect.  
 Spikes usually broad and blunt, the lateral ones short, mostly spreading, making a lumpy or narrow panicle..... 3. *A. hybridus* var.  
 Spikes acute or narrow at apex, slender and continuous, erect, aggregated into a large panicle..... 4. *A. paniculatus*

1. *A. tricolor*, L. (*A. melancholicus*, L. *A. gangeticus*, L.) One–4 ft., diffuse and branching, st. usually glabrous: lvs. ovate or oval, abruptly tapering to long petiole, short-pointed or obtuse, green and not thick or stiffish and comprising races with blotched and colored lvs. in shades of red and green, grown for ornament under such names as Josephs Coat, *A. bicolor*, *A. coleifolius*: glomerules small and sessile in nearly or quite all the axils often even to the ground, those in the uppermost axils becoming 1 or 2 in. long and spike-like but usually interrupted, those terminating branches and st. longer: scales long-pointed, mostly prominent. Tropics, probably Asian; sometimes grown as a pot-herb and commonly so in some oriental countries.—Var. *angustior*, Bailey (*A. salicifolius*, Hort., not Veitch), has narrow lf.-blades, lanceolate to lance-ovate, the petioles thereby appearing prominent.

2. *A. caudatus*, L. (*A. abyssinica*, Hort.). LOVE-LIES-BLEEDING. Stout branching profuse plant, 3–5 ft., known by its bending or drooping naked panicle when mature, and particularly by the many slender divaricate and drooping or flexuose lateral spikes, and in characteristic races by the long tail-like terminal spike, all usually red and showy: lvs. ovate or oval, practically as in No. 1. Tropics; an old garden plant.—There are vars. with very dark red panicles, also whitish and yellowish; var. *gibbosus*, Vilm., has interrupted spikes as if made up of separate heads or glomerules. Well marked in its extreme forms with heavy drooping spikes. It is the commonest of the cult. amaranths in this country.

3. *A. hybridus*, L., var. *hypochondriacus*, Bailey (forma *hypochondriacus*, Rob. *A. hypochondriacus*, L.). PRINCES-FEATHER. Tall glabrous plant with erect rather stiff panicle of short lateral mostly blunt spreading spikes and a strong terminal one, the infl. looking narrow, stiff and clumpy: scales or bracts long-awned. Tropics; frequently cult. and sometimes escaped.—Panicles usually red but some vars. are greenish and of different shades of red. *A. hybridus* itself is a prevalent weed, often assuming red tints.

4. *A. paniculatus*, L. (*A. hybridus* var. *paniculatus*, Uline & Bray). TASSEL AMARANTH. Perhaps a developed race of No. 3: usually pubescent: scales with less prominent points: spikes many, long, slender and strongly ascending, with a tendency to be narrow or acute at apex, making a heavy profuse erect panicle, red, purple, or yellowish. Tropics; sometimes seen in gardens, also adventive.—Nos. 2, 3, and 4 are probably major races of a single species, and some of the forms are difficult to place. Some of the forms have a decidedly weeping, melancholy, or hypochondriac effect.

2. CELOSIA, L. Probably 30–40 species, in warm countries of eastern and western hemispheres, the cult. kinds annual: differs technically from *Amaranthus* in the 2 or more ovules: lvs. alternate, entire or rarely lobed: st. and branches terminated by dense chaffy spikes which in cult. forms are enlarged and highly colored, the st. often much fasciated and forming a cockscomb: fls. bisexual, the perianth 5-parted; stamens 5, filaments united at base: fr. a utricle, mostly dehiscent, included in persistent perianth or exserted, 2- or more-seeded. (Celo-sia: Greek *kelos*, burned, from the color and character of infl.)

**C. argentea**, L. A weed in trop. countries, probably of Asian origin: erect, glabrous, 2-3 ft.: lvs. 2 in. and more long, linear-lanceolate to lance-ovate: spikes conical to long-oblong, 1 to several in. long, silvery-white.—Some of the cult. forms are very like the wild plant, with long narrow silvery-white spikes; but most of the domesticated improved races may be referred to var. *cristata*, Kuntze (*C. cristata*, L.), **COCKSCOMB**: mostly lower: infl. modified through a wide range of forms between which grades of intermediates occur, necessitating careful attention to seed-breeding: some forms are heavy-headed short plants with widely fasciated convoluted combs; others are cristate or feathered; others are open-growing plants with plummy slender spikes and panicles; the colors range from white to yellow, purple, and shades of red; there are also kinds with variegated lvs.; grotesque forms are not uncommon. Latin-form names have been given to the cult. races as *C. Thompsonii*, *Childsii*, *plumosa*, *floribunda*.

**3. IRESINE**, P. Br. Herbs and subshrubs, mostly erect, two or three cult. for the colored foliage; native in many trop. and temp. regions, probably 40 species.—Lvs. opposite, usually ovate, simple, petioled: fls. bisexual or unisexual, white or straw-colored, very small, in axillary and terminal mostly small spikes that are aggregated into panicles; bracts usually 3 to each fl.; perianth 5-parted, in the fertile fls. usually woolly; stamens prevailingly 5, filaments united at base; stigmas 2 or 3: fr. a 1-seeded indehiscent utricle. (Iresi-ne: Greek allusion to the woolly fls. and seeds.)—Aside from the following, *I. Celosia*, L. (*I. paniculata*, L.), native from O. far southward, is sometimes planted in the tropics in a race with colored lvs. The two following are much used as bedding plants, rarely blooming, being propagated by cuttings; probably perennial; S. Amer.

Lvs. nearly orbicular, notched at apex.....1. *I. Herbstii*

Lvs. lance-ovate, pointed.....2. *I. Lindenii*

**1. I. Herbstii**, Hook. f. (*Achyranthes Verschoffeltii*, Lem.). Lvs. broadly ovate to nearly orbicular, 1-2 in. long, most of them deeply notched at apex, purplish-red with lighter midrib and arched side veins, or green or bronzy with yellowish veins: fls. very small, whitish, numerous in long-peduncled axillary and in terminal compound panicles: plant reaches 6 ft. high in tropics, with lvs. 5 in. across. (Named for Mr. Herbst, propagator at the Royal Botanic Gardens, Kew, England.)

**2. I. Lindenii**, Lem. (*Achyranthes* and *Iresine acuminata*, Hort.). St. and lvs. usually deep red in cult. stock, but sometimes green: lvs. lance-ovate or somewhat broader, acuminate, with prominent thin veins. (Named for J. Linden, 1817-1898, noted Belgian horticulturist.)

**4. TELANTHERA**, R. Br. Perhaps a half-hundred species, mostly of the New World tropics, the cult. kinds herbaceous or treated as such, used for carpet-bedding under the name of Alternanthera (with which genus some authors unite them).—Lvs. opposite, narrow, petiolate or tapering at base: fls. small, in dense small sessile glomerules mostly in the axils; perianth 5-parted, the parts in two unlike series; filaments united into a long tube that bears 5 anthers and 5 sterile points or staminodia, in the character of staminal tube being distinguished from Alternanthera: fr. a 1-seeded indehiscent utricle. (Telanthera: ten parts of staminal tube present.)—The following species are probably Brazilian; the kinds in cult. are not clearly understood botanically. The plants are usually kept down to a few in. high; little whitish fl.-clusters may appear late in the season; propagated by cuttings.

Lvs. lanceolate or elliptic.....1. *T. amœna*

Lvs. narrow-spatulate, tapering to long petiole.....2. *T. Bettzickiana*

Lvs. round-spatulate, abruptly contracted to short petiole.....3. *T. versicolor*

**1. T. amœna**, Regel. A very dwarf plant with long-lanceolate or somewhat oblong-lanceolate or elliptic short-petioled long-acute lvs. mostly veined and blotched red and orange.

**2. T. Bettzickiana**, Regel. Lvs. narrow-spatulate, gradually tapering into long petiole, acute or even somewhat mucronate at apex, blotched and colored in many shades, white-yellow to red. (Named in compliment to Hofgartner Bettzick.)—Apparently the common species in cult.

3. *T. versicolor*, Regel. Lvs. broad- or round-spatulate, main part of blade nearly as broad as long, obtuse, abruptly narrowed into short petiole, commonly copper-red or blood-red.

5. *GOMPHRENA*, L. One common garden annual grown as an "ever-lasting"; 90 or more species in the genus, the larger number in the New World tropics, annual and perennial hairy herbs, erect or prostrate.—Lvs. opposite, not lobed: fls. bisexual, mostly in dense chaffy usually peduncled heads which are sometimes provided with involucre-like bracts at base; perianth sessile under the bracts, 5-parted, the parts equal or unequal; filaments united into long 5-parted tube, the lobes emarginate or bifid: fr. a 1-seeded mostly indehiscent utricle. (Gomphre-na: from an ancient name for an amaranth.)

*G. globosa*, L. *GLOBE-AMARANTH*. Rather stiff erect branching plant 12–20 in. high, with a clover-like aspect due to the globular or short-oblong dense long-peduncled heads which are white, yellowish, violet, or red in different garden races, and closely subtended by 2 broad leafy bracts: lvs. oblong to elliptic or somewhat obovate, 2–4 in. long, hairy, margins entire and ciliate. Old World tropics.

6. *DEERINGIA*, R. Br. Herbs and subshrubs sometimes climbing, of about a half-dozen species, Madagascar, Australia, and the Pacific Isls.—Lvs. alternate, petiolate, not lobed, usually ovate: fls. bisexual or unisexual (plants sometimes dioecious), small and not showy, in axillary and terminal spikes and racemes that are sometimes assembled in panicles; perianth of 5 segms.; stamens 4 or 5, filaments connate at base into a cup or ring; stigmas 2–4: fr. more or less baccate, with few or many seeds. (Deering-ia: Geo. C. Deering, physician and botanist in England; died 1749.)

*D. amaranthoides*, Merr. (*D. celosioides*, R. Br. *D. baccata*, Moq.). Glabrous woody climber from Australia, somewhat grown in Calif., 10–12 ft.: lvs. ovate to ovate-lanceolate, acuminate, entire: fls. in axillary and terminal clusters, sometimes in simple racemes but oftener in little racemed clusters which are more or less collected in panicles: fr. a red nearly globular berry about  $\frac{1}{4}$  in. or less in diam., giving the plant an ornamental appearance. There is a var. with variegated foliage.

#### 48. NYCTAGINACEÆ. FOUR O'CLOCK FAMILY

About 25 genera and 350 species of herbs, shrubs, and trees, of wide geographical distribution in warm regions but most abundant in Amer.; a few grown for ornament.—Lvs. simple, opposite or alternate, entire, exstipulate: infl. various; fls. regular, bisexual or rarely unisexual, usually subtended by an involucre of separate or united bracts; petals 0; calyx inferior, often petaloid, campanulate, tubular or salverform, persistent after flowering and enveloping the fr., often woody or leathery; stamens 1 to many, hypogynous, free or united at base; style 1; ovary 1-celled, 1-ovuled, sessile or stipitate: fr. a ribbed, grooved, or winged achene.

Fls. inclosed by showy colored bracts. .... 1. BUGINVILLEÆ

Fls. not inclosed by colored bracts.

Involucre of united bracts, calyx-like. .... 2. MIRABILIS

Involucre of 5–15 distinct bracts. .... 3. ABRONIA

1. *BUGINVILLEÆ*, Comm. Characteristic porch and arbor vines in warm countries and sometimes grown in greenhouses in the N.; about 10 species of shrubs from S. Amer.—Lvs. alternate, petioled, ovate or elliptic-lanceolate: fls. small and inconspicuous, inclosed by large showy purple or red bracts, usually 3 together, the peduncles adnate to the midvein of the bracts; tube of perianth usually green, limb 5–6-lobed, rose or yellow; stamens 7–8, included, on unequal filaments; ovary stipitate; style lateral: achene 5-ribbed. (Buginvilleæ: after de Bougainville, 1729–1811, French circumnavigator; commonly but not originally written *Bougainvillea*.)

Twigs and lvs. glabrous or nearly so. .... 1. *B. glabra*

Twigs and lvs. markedly tomentose-pubescent. .... 2. *B. spectabilis*



1. *B. glabra*, Choisy. Glabrous or only slightly pubescent, with a woody trunk attaining 1 ft. or more in diam. and often growing over buildings in the tropics and warm countries: sts. spiny: lvs. oblong-lanceolate or ovate-oblong, acuminate, tapering or wedge-shaped at base: fls. mostly scattered on long leafy wand-like branches with elliptic or elliptic-lanceolate magenta or purple bracts. Brazil.—The floriferous form, var. *Sanderiana*, Hort., belongs here. There is also a var. with white-variegated lvs.

2. *B. spectabilis*, Willd. Very similar to *B. glabra* but differing in being densely tomentose, the lvs. more ovate and obtuse and broader at base, the fls. more or less glomerate at the ends of the branches with long outer ray-like peduncles, the bracts elliptic-ovate, in shades of red. Brazil.—A race with brick-red bracts is var. *lateritia*, Lem.

2. *MIRABILIS*, L. Perennial herbs, but two of them grown as annuals in flower-gardens, of about 12 species in the warmer parts of Amer.—Roots often thickened and tuberous: lvs. opposite, petioled or the upper sessile: fls. 1 or many in a 5-lobed calyx-like involucre; calyx variously colored, tube elongated, constricted above ovary, limb spreading, 5-lobed, deciduous; stamens 5–6, as long as the perianth or sometimes exerted, on unequal filaments which are united at base; style filiform with capitate stigma: fr. leathery, ribbed. (*Mirabilis*: Latin for *wonderful*.)

Involucre 1-fld.; calyx-tube 1–2 in. long. .... 1. *M. Jalapa*  
Involucre 3- or more-fld.; calyx-tube 4–6 in. long. .... 2. *M. longiflora*

1. *M. Jalapa*, L. FOUR O'CLOCK. MARVEL-OF-PERU. Quick-growing herb with erect much-branched sts. from 1–3 ft. high, glabrous or slightly pubescent: lvs. deep green, ovate, acuminate, truncate or cordate at base, with petioles almost half as long as blades: fls. about 1 in. across, blooming in late summer and fall, opening late in the afternoon, white, red, yellow, or striped; involucre containing only 1 fl.; calyx trumpet-shaped, the tube 1–2 in. long. (*Jalapa*: the tuberous roots were once supposed to be the source of jalap.) Trop. Amer.; spontaneous in the S.—There are dwarf and compact vars. and kinds with variegated foliage.

2. *M. longiflora*, L. Much-branched herb to 3 ft. high, glandular-pubescent: lvs. cordate, acuminate, the upper almost sessile: fls. very fragrant, opening in evening, with slender tube 4–6 in. long and white, rose, or violet limb; involucre containing 3 or more fls. Mex.—Hybridizes with *M. Jalapa*.

3. *ABRONIA*, JUSS. SAND-VERBENA. About 45 species of annual and perennial herbs, native mostly in W. N. Amer., two or three grown in borders, rockeries, and baskets.—Erect or prostrate, usually glandular-pubescent: lvs. opposite, petioled, unequal, rather thick: fls. few to many in a peduncled head which is subtended by 5 or more distinct bracts, red, yellow or white, fragrant; calyx corolla-like, with elongated tube constricted above ovary, and 5-lobed limb; stamens 3–5, unequal, inserted on tube of perianth, included: fr. leathery, 1–5-ribbed or -winged. (*Abro-nia*: from Greek for *delicate*.)

Fls. yellow. .... 1. *A. latifolia*  
Fls. rose-purple. .... 2. *A. umbellata*

1. *A. latifolia*, Esch. (*A. arenaria*, Menz.). Perennial with thick fleshy roots: sts. prostrate, 1–3 ft. long, the lvs. and flowering peduncles ascending or erect: lvs. thick, ovate or orbicular, reniform or truncate at base, obtuse, on thick petioles: fls. numerous, bright yellow, on peduncles usually exceeding the lvs.: fr. acute at each end, with 4–5 thick wings. Sea-coast, B. C. to Calif.

2. *A. umbellata*, Lam. Prostrate perennial with sts. 1–3 ft. long: lvs. thin, ovate to narrowly oblong, obtuse, slender-petioled: heads 10–15-fld. on peduncles 2–6 in. long, with small narrowly lanceolate bracts; calyx rose-purple: fr. attenuate at each end, usually with 5 thin wings much narrowed below and truncate or tapering above. Sea-coast, B. C. to Calif.

## 49. PHYTOLACCÆ. POKEWEED FAMILY

Herbs, shrubs, or trees mostly native in trop. and subtrop. Amer. and S. Afr., of about 22 genera and 100 species; little known in general cult.—Lvs.

alternate, entire, usually exstipulate: fls. mostly in axillary or terminal racemes, bisexual or monœcious, regular; calyx 4-5-parted, persistent; petals usually 0; stamens as many as the calyx-segms. and alternate with them, or more numerous, hypogynous, distinct or united at base; ovary usually superior with 1 to many distinct or united carpels; ovules solitary in the carpels; styles as many as carpels, short or none, the stigmas linear or filiform: fr. a berry, caps., or samara.

Ovary of 5-16 distinct or united carpels ..... 1. PHYTOLACCA  
Ovary of 1 carpel ..... 2. RIVINA

1. **PHYTOLACCA**, L. Twenty-six species of herbs, shrubs, or trees, of trop. or subtrop. regions, mostly Amer. but a few in Afr. and Asia; one species cult. as an ornamental and shade tree in S. Calif. and Fla.—Of erect or climbing habit, with angled or subterete branches, glabrous or nearly so: lvs. petioled or rarely sessile, ovate, elliptic or lanceolate: fls. small, in erect or nodding terminal racemes which by further growth of the st. may come opposite the lvs.; pedicels bracted at base; stamens 6-33, in two series; ovary subglobose, of 5-16 free or united carpels: fr. a fleshy berry. (Phytolacca: from Greek for *plant* and French *lac*, lake (a color), referring to the crimson juice of the berries.)—*P. esculenta*, Van Houtte, is cult. in Eu. as a pot-herb; it may be distinguished by its bisexual fls. and usually 8 stamens and carpels.

*P. dioica*, L. (*Pircunia dioica*, Moq.). Evergreen tree of very rapid growth, attaining great thickness of trunk and spread of top: lvs. glabrous, slender-petioled, elliptic or ovate, mostly broadly acute at apex, the mid-nerve prominent: fls. dioecious, in suberect or pendulous racemes scarcely surpassing the lvs.; staminate fls. with 20-30 stamens much longer than calyx; pistillate fls. with about 10 staminodia and 7-10-carpelled ovary: berry with carpels united at base and free at apex. S. Amer.; escaped in Medit. region and India.

2. **RIVINA**, L. Three species of erect herbs native of trop. and subtrop. Amer., but introduced into Asia, Australia, and African isls.; one species is commonly grown for its red berries under glass and out-of-doors as a summer annual.—Shrubby at base: lvs. slender-petioled, ovate, acuminate, rounded or subcordate at base: racemes many-flid., erect or flexuous; pedicels with minute bracts at base; fls. bisexual, small; calyx 4-parted; stamens 4, shorter than calyx; ovary ovoid, of 1 carpel; style shorter than ovary, slightly curved: berry red, pea-shaped. (Rivina: for A. Q. Rivinus, 1652-1725, professor of botany at Leipzig.)

*R. humilis*, L. **ROUGE-PLANT**. From 1-3 ft. high, with spreading branches, pubescent when young: lvs. 2-4 in. long: racemes about as long as lvs.; calyx white or rosy. Ark. to Fla. and Tex., W. Indies, Cent. and S. Amer.

## 50. AIZOACEÆ. CARPET-WEED FAMILY

Erect or prostrate herbs and subshrubs, often fleshy and inhabitants of deserts and sea-shores, mostly of little value horticulturally; genera above 20 and species probably 500 and more, of wide distribution, mostly in warm countries; a rather miscellaneous family, distinguished from related families by combinations of characters.—Habit various, the plant sometimes reduced to a small succulent body without foliage lvs., in other cases much branched and with well-developed lvs. which may be opposite, whorled, or alternate, but mostly opposite and without stipules: fls. bisexual, regular, petals often lacking, the perianth then of one set of 4 or 5 parts which are united or distinct; stamens as many as the perianth-parts and alternate with them, or in some genera numerous and many of them perhaps represented by showy staminodia or staminoid petals and causing the fl. to look like one of the Compositæ; ovary mostly superior, but in ours wholly or partly inferior, 2- or more-celled,

with as many stigmas: fr. a caps. or nut-like body, mostly many-seeded; embryo curved or ring-like.

Petals wanting: ours a broad-leaved pot-herb.....1. TETRAGONIA

Petals many: usually narrow- or very fleshy-leaved, grown mostly for ornament.....2. MESEMBRYANTHEMUM

1. **TETRAGONIA**, L. About 25 species of herbs and subshrubs, erect, trailing or partially scandent, in E. Asia, and the southern hemisphere on both sides of the world; one is a hort. subject.—Lvs. alternate, narrow or broad, more or less fleshy: fls. small, axillary, solitary or few together, petals wanting, perianth 3–5-lobed and adnate to ovary and often extended above it; stamens 1 or more, inserted on perianth-tube; ovary 2–8-celled, ovules solitary in each cell: fr. indehiscent, obconic or globose, often horned at top. (*Tetragonia*: *four-angled*, in allusion to the fr.)

**T. expansa**, Muir. NEW-ZEALAND-SPINACH. Vigorous spreading prostrate annual, often covering several ft., thick and somewhat succulent, papillose, glabrous: lvs. deltoid to deltoid-ovate, 2–5 in. long, obtuse or nearly so, abruptly narrowed into short petiole: fls. 1 or 2 in the axils, nearly sessile, yellowish-green, not conspicuous: fr. somewhat top-shaped, angled,  $\frac{1}{2}$  in. long, dry and hard, crowned with horns. Japan, Australia, New Zeal., extra-trop. S. Amer.; cult. as a pot-herb and sometimes escaped.

2. **MESEMBRYANTHEMUM**, L. FIG-MARIGOLD. As usually defined, the species are 300–400, but recently the genus has been broken into several; the species are prevailing S. African, but a few are native in other countries, 3 in Calif.; many of them have been introduced to cult., but very few are yet other than fancier's plants.—Natives of hot desert or arid places, mostly succulent, sometimes reduced to a compact fleshy body, annual and perennial, the branching kinds prostrate or erect: lvs. flat, terete or angled, entire but sometimes spiny-margined, opposite, whorled or alternate: fls. mostly large for the size of the plant and showy, axillary or terminal and commonly solitary, most of them opening in the sun and some of them at certain hours; petals and stamens very many, white, red, or yellow; calyx mostly with 5 lf.-like lobes: fr. a 5-many-celled and many-seeded caps., radiately dehiscent at summit, often fleshy, hygroscopic. (*Mesembryanthemum*: Greek *midday-flower*, as the blossoms usually close at night and in shadow.)

Plant bearing glittering papillæ, tubercles, or vesicles, giving it a more or less crystalline appearance.

Stigmas 4 or 5.

Lvs. alternate: plant much branching.....1. *M. crystallinum*

Lvs. opposite: plant much branching.....2. *M. cordifolium*

Lvs. connate at base, radical and basal.....3. *M. lineare*

Stigmas 10 or more.....4. *M. pomeridianum*

Plant smooth, without shining points or vesicles.

Lvs. thick, scimitar-shaped, 3-sided: stigmas 8.....5. *M. edule*

Lvs. slender, linear or nearly so: stigmas 5.

Fls. 3 (1 or 2 sometimes failing), peduncles (at least the lateral)

bracted, scarcely thickened above.....6. *M. blandum*

Fls. 3–5 on a long 2–4-bracted peduncle which is thickened above.....7. *M. multiradiatum*

Fls. solitary, peduncle bractless.

Diam. of fls. about 2 in.; petals in many series.....8. *M. aureum*

Diam. less; petals in about 3 series.....9. *M. aurantiacum*

1. **M. crystallinum**, L. ICE-PLANT. Annual and biennial, spreading on the ground, with large glistening vesicles: lvs. alternate (at least on branches), flat, fleshy, spatulate or broad-ovate, undulate, base clasping: fls. whitish to light rose, small, almost sessile in the axils; calyx 5-cleft, the lobes ovate. Of wide distribution, Greece and Canary Isls., S. Afr., S. Calif.; grown as a window-plant, garden annual, and reported sometimes in the vegetable-garden for greens.

2. **M. cordifolium**, L. f. Diffusely branching, minutely papillose, little or scarcely fleshy, sts. to 2 ft. long: lvs. opposite, flat, cordate-ovate and petiolate, 1 in. or less long: fls. terminal and lateral, solitary, small, purple, pedicelled;



FIG. 9. VARIOUS STRUCTURES BETULACEÆ TO CALYCANTHACEÆ.

A, *Betula*, showing fruiting cones and separate scales. B, *Carpinus caroliniana*, fruiting catkin, with separate fruit and scale. C, *Rumex*, showing fruiting calyx bearing grains on the three sides. D, Details of *Polygonum orientale*. E, F, Circumscissile pods of *Amaranthus* and *Portulaca* respectively. G, *Saponaria officinalis*, showing habit, flower, and two detached petals. H, Carnation, with doubled corolla, showing short calyx bracts. I, *Hepatica*, showing the calyx-like involucre and the head of achenes; Jj, side view of flower. J, Follicles and separate achenes. K, *Pulsatilla* (*Anemone*), flower, leaf, and tailed achenes. L, Staminate flower of *Thalictrum*. M, *Aquilegia*; flower, with separate sepal and tubular petals; fruit. N, *Berberis vulgaris*; flower and dehiscent anther. O, *Calycanthus*; longitudinal section of calyx-tube; anther.



petals short and linear; calyx  $\frac{1}{2}$  in. long, obconical, with 2 subulate lobes and 2 large ones equaling or exceeding the tube. S. Afr.; a window-garden plant; there is a var. with variegated lvs.

3. *M. lineare*, Thunb. (*M. pyropæum*, Haw. *M. tricolor*, Willd. *M. tricolorum*, Hort.). Annual, with main st. very short, the branches arising from near the base, tuberculose or papillose, making densely-fld. clumps 6–8 in. across but not so high: lvs. opposite and somewhat joined at base, somewhat fleshy, linear, canaliculate, 2–3 in. long, sometimes broader near apex: fls. solitary on peduncles 1–4 in. long that are radical or terminate the branches, 1–1½ in. diam., varying from light pink with red center to self-colored white, pink, and red. S. Afr.; grown as a flower-garden annual for its abundant bloom.

4. *M. pomeridianum*, L. Annual, diffuse or practically erect, branched: lvs. flat, spatulate or spatulate-lanceolate, 2 in. and more long, tapering into a grooved petiole, smooth, ciliate: fls. yellow, 1½ in. across, on long hairy peduncles; petals numerous and narrow, in many series; calyx hemispherical, with 2 of the lobes lf.-like and exceeding the petals. S. Afr.; a good flower-garden subject.

5. *M. edule*, L. Perennial, with woody angular decumbent sts., covering banks: lvs. opposite and connate, 3–4 in. long, thick and 3-sided, upwardly curved or scimitar-shaped, the keel finely serrate: fls. large and solitary, yellow (but said sometimes to be purple), on peduncles 1 in. long; petals many; calyx top-shaped, with 5 unequal lobes: fr. fleshy and edible, one of the species known as Hottentot-fig. S. Afr.; established in Calif.

6. *M. blandum*, Haw. Subshrubby, with rigid erect or ascending numerous branches, 2 ft. high: lvs. distant, opposite and connate at base, 3-angled but compressed, linear, 1–2 in. long, smooth: fls. normally ternate but often 2 or solitary by abortion, large, pale rose-color, on peduncles 2 in. long; petals many, much longer than the 5 calyx-lobes, 2-toothed. S. Afr.

7. *M. multiradiatum*, Jacq. (*M. roseum*, Willd.). Subshrubby, 1–2 ft., the branches spreading: lvs. many, scarcely or not at all connate at base, linear, about 1–1½ in. long, incurved, somewhat 3-angled with the keel broadened above the middle, glaucous: fls. 3–5 together, 1½ in. across, pale rose-color, showy, on a peduncle thickened above; petals in 2 series, 2-toothed; calyx top-shaped. S. Afr.; much planted in Calif.

8. *M. aureum*, L. Woody at base, with erect somewhat flattened branches, 2 ft.: lvs. mostly distinct, obscurely 3-angled, linear, 1–2 in. long, smooth and glaucous: fls. 2 in. across, golden-yellow, mostly solitary on long bractless peduncles; petals in many series; calyx 5-cleft. S. Afr.

9. *M. aurantiacum*, Haw. Less robust than No. 8: lvs. 1 in. or less long, 3-angled: fls. orange, 1½ in. across, the petals in about 3 series. S. Afr.

## 51. PORTULACACEÆ. PURSLANE FAMILY

Mostly more or less fleshy herbs and small subshrubs, the larger part native of the Americas in tropics and subtropics and beyond, but some of them widely native in the Old World; a few are grown for ornament and as pot-herbs; genera 18–20; species 160–200.—Plants prostrate or erect, mostly glabrous: lvs. alternate or opposite, sometimes connate, entire: fls. bisexual, regular or irregular; sepals usually 2; petals 4–5 or seldom more, sometimes connate at base, often emarginate, mostly fugacious; stamens few or many, in most genera hypogynous; ovary single, 1-celled, with central or basal placenta; style 2–3-parted: fr. a mostly dehiscent caps. circumscissile or 3-valved; seeds mostly many, with curved or ring-like embryo. *F*, Fig. 9.

Fr. a circumscissile caps.: ovary cohering with calyx-tube.....1. PORTULACA

Fr. with 2–3 valves: ovary free.

Seeds 3 or less: lvs. opposite in our species.....2. MONTIA

Seeds many: lvs. alternate.....3. CALANDRINIA

1. PORTULACA, L. PURSLANE. Trailing fleshy mostly annual herbs, of about 20 species largely American, glabrous or pilose: lvs. usually alternate or scattered, flat or terete, the upper ones forming an involucre to the inconspicuous or showy fls. which open in sunshine; sepals 2, forming a tube at base and adnate with ovary; petals mostly 6, inserted on calyx, as also are the 7

or more stamens; style 3-9-parted: fr. a circumscissile little dry pod, 1-celled, containing many seeds. (Portula-ca: an old Latin name.)

Lvs. broad and flat, although thick; plant smooth. . . . . 1. *P. oleracea* var.

Lvs. terete: plant more or less pilose.

Plant with long thin hairs but not prominently woolly. . . . . 2. *P. grandiflora*

Plant looking white-woolly from the abundant tufts of hairs at nodes and with the fls. . . . . 3. *P. pilosa* var.

1. *P. oleracea*, L., var. *sativa*, DC. KITCHEN-GARDEN PURSLANE. Erect, 12-20 in., finally spreading, branches thick and soft, wholly glabrous: lvs. obovate or spatulate, very obtuse, 1-1½ in. long, tapered to a very short petiole or petiole-like base: fls. ½ in. or more across, bright light yellow, strongly clustered at top of st.; petals 6 or 7, erect-spreading, retuse; stamens usually 11 or more; stigmas 5 or 6, large and long. Grown somewhat as a pot-herb; probably a cultigen.—Var. *gigantes*, Bailey. Plant prostrate and widely spreading: fls. very double, bright yellow, 1 in. or more across, well set off against the prominent lf.-bracts. Cultigen; a showy plant, to be expected in our southern gardens.

2. *P. grandiflora*, Hook. ROSE-MOSS. Prostrate or ascending, with loose hairs at the joints and among the fls.: lvs. scattered, terete, 1 in. or less long, mostly long and prominent beneath the fls.: fls. 1 in. and more across, in bright colors, rose, red, yellow, striped, white, soon withering; sepals broad, short-acute; petals obovate, more or less notched at the end. Brazil and S.; a popular flower-garden annual, and sometimes escaped.

3. *P. pilosa*, L., var. *hortualis*, Bailey. SHAGGY GARDEN PURSLANE. Small plant, spreading or ascending, with a woolly or white-shaggy look due to the copious tufts of hairs at the joints and beneath the fls.: lvs. terete, about ½ in. long: fls. red-purple, ¾ in. across, showy; petals broadly obovate, obtuse but more or less emarginate; sepals oblong, nearly or quite acute. Cultigen; a flower-garden annual, probably occurring south within our borders.—*P. pilosa* itself, native from N. C. and Kans. south to the tropics, has much smaller and not showy fls.

2. *MONTIA*, L. Glabrous annuals and perennials of small size, about 20 species in Amer.—Lvs. opposite in the following species, but in certain others alternate, more or less fleshy: fls. minute, solitary, or in loose racemes, white or pinkish, usually nodding; sepals mostly 2, persistent, broad; petals 3-5, often connate at base; style 3-parted: fr. a 3-valved caps., with 3 or fewer seeds. (Mont-ia: Guiseppe Monti, professor of botany at Bologna in first half of 18th century.)

*M. perfoliata*, Howell (*Claytonia perfoliata*, Donn. *Limnia perfoliata*, Haw.). WINTER-PURSLANE. Short-lived annual, mostly a winter plant in warm countries, sometimes grown as a salad and pot-herb: lvs. all radical except 2 that are connate beneath the fls., rhomboid-ovate to spatulate-obovate, with very long petioles: scapes 3-12 in. high bearing the small white short-pedicelled fls. at the summit. B. C. to Mex.; introduced into other regions and countries.

3. *CALANDRINIA*, HBK. A very few plants of small size sometimes grown as flower-garden annuals, of minor importance horticulturally; the species are more than 60 if the genus is construed broadly, mostly on the western side of N. and S. Amer.—More or less fleshy, annual and perennial: lvs. alternate or basal, narrow: fls. red or rose-colored, in bracted racemes of short duration; petals 3-7, usually 5; sepals 2, persistent; stamens mostly 5-12, rarely fewer or more; style 3-cleft: fr. a globose or ovoid caps. dehiscing by valves; seeds usually many. (Calandrin-ia: J. L. Calandrini, botanist of Geneva, who wrote an important thesis in 1734.)

Fls. racemose or scattered along the branches. . . . . 1. *C. caulescens* var. *Menziesii*

Fls. many in terminal umbel-like cluster. . . . . 2. *C. umbellata*

1. *C. caulescens*, HBK., var. *Menziesii*, Gray (*C. Menziesii*, Torr & Gray. *C. speciosa*, Lindl.). RED MAIDS. Annual, branching from the base or sometimes simple, 3-5 or more in. high: lvs. narrow-spatulate to linear, acute: fls. crimson or rose-red to purplish, rather large, the petals ¼-½ in. long and retuse at apex; sepals ovate, covering the caps. B. C., Calif.

2. *C. umbellata*, DC. Perennial but grown as an annual: st. nearly erect: lvs. mostly radical, linear, acute, pilose: fls. many in terminal clusters, bright crimson; sepals nearly orbicular. Peru.

## 52. BASELLACEÆ. BASELLA FAMILY

Climbing perennial fleshy herbs, of 5 genera and about 15 species, native in trop. Amer. and 1 genus in trop. Asia, a few cult. for food and ornament.—Rootstocks tuberous: lvs. alternate, usually petioled, broad, entire, mostly fleshy, glabrous: fls. bisexual, regular, racemose, small, with 2 bracts; sepals 2, sometimes adnate to the base of the corolla; petals 5, separate or somewhat united, persistent, remaining closed; stamens 5, opposite the petals; ovary superior, 1-celled, 1-ovuled; styles usually 3, with entire or cleft stigmas: fr. indehiscent, inclosed in the corolla.—The Ulluco of Peru, Bolivia and Chile, grown for its subterranean tubers, is *Ullucus tuberosus*, Caldas, of this family.

|                      |                   |
|----------------------|-------------------|
| Fls. sessile.....    | 1. BASELLA        |
| Fls. pedicelled..... | 2. BOUSSINGAULTIA |

1. **BASELLA**, L. MALABAR-NIGHTSHADE. Fleshy annual or biennial herbs grown in the tropics and warm countries as pot-herbs, of 2 variable species distributed throughout the tropics, probably Asian.—Twining glabrous vines: fls. small, sessile, in clusters on elongated thickened peduncles in an open branching infl.; sepals somewhat carinate but not winged in fr.; filaments erect in bud. (Basel-la: native Malabar name.)

|  |                    |
|--|--------------------|
| Lvs. as broad as long, cordate or subcordate at base: fls. reddish.....                        | 1. <i>B. rubra</i> |
| Lvs. narrower, prevailing longer than broad, rounded or tapering at base:<br>fls. whitish..... | 2. <i>B. alba</i>  |

1. ***B. rubra***, L. A rampant-growing vine with green or purplish sts.: lvs. 2-6 or more in. wide, about as broad as long, ovate to suborbicular, cordate at base, obtuse or somewhat emarginate: fls. on short spikes, in small clusters, reddish: fr. ovoid or globose.

2. ***B. alba***, L. Very similar but with narrower lvs. ovate to ovate-lanceolate, prevailing longer than broad, rounded or tapering at base, acute or slightly obtuse, somewhat undulate, and whitish fls. in longer-peduncled spikes arranged in very loose clusters.

2. **BOUSSINGAULTIA**, HBK. Perennial herbaceous vines, of 10 species in trop. Amer., one of which is grown over arbors and porches.—Sts. much-branched: fls. small, pedicelled, in axillary and terminal spike-like racemes; sepals nearly flat, not winged; filaments bent over in bud. (Boussingault-ia: after J. B. Boussingault, 1802-1887, French agricultural chemist.)

***B. baselloides***, HBK. MADEIRA-VINE. MIGNONETTE-VINE. A rapidly-growing twining vine attaining 10-20 ft. in a season, producing little tubercles in the axils of the lvs. by means of which the plant is propagated: root tuberous and hardy in the N.: lvs. ovate, 1-3 in. long, subcordate at base, short-petioled: racemes slender, sometimes 1 ft. long, many-fl'd.; fls. white, becoming black with age, fragrant, blooming in late summer or fall. Trop. Amer.; run wild in Tex. and Fla.; much like *Basella* in foliage and habit, whence the name *baselloides*.

## 53. CARYOPHYLLACEÆ. PINK FAMILY

About 70 genera and more than 1,200 species of herbs, rarely suffruticose, widely distributed over the earth, most abundant in temp. and cold regions; the family contributes many annuals and perennials to the flower-garden, and the carnation is also extensively grown under glass; there are no "foliage plants" amongst them.—Sts. usually swollen at the joints: lvs. opposite, entire, often united at base: fls. regular, usually bisexual; sepals 4-5, persistent, free or united; petals 4-5 or rarely wanting; stamens 8-10 or seldom fewer, hypogynous or perigynous; styles 2-5, free or sometimes united; ovary superior, 1-celled, rarely 2-5-celled, with free central or basal placenta, ovules 1 to many: fr. a caps., rarely a berry, opening by valves or indehiscent; seeds albuminous; embryo strongly curved or coiled. *G*, *H*, Fig. 9, page 258.

- A. Ovary 1-ovuled: petals absent. .... 1. HERNIARIA  
 AA. Ovary several-ovuled: petals present.  
 B. Sepals united into tube or cup.  
 C. Base of calyx with scaly bracts or small lvs.  
 D. Calyx conspicuously scarious between its green nerves: fls. small. .... 2. TUNICA  
 DD. Calyx not scarious: fls. large. .... 3. DIANTHUS  
 CC. Base of calyx without bracts.  
 D. Styles 2.  
 E. Pod deeply 4-valved: calyx conspicuously scarious between its green nerves. .... 4. GYPSOPHILA  
 EE. Pod shortly 4-valved: calyx not scarious. .... 5. SAPONARIA  
 DD. Styles 3. .... 6. SILENE  
 DDD. Styles 5. .... 7. LYCHNIS  
 BB. Sepals distinct or nearly so.  
 C. Caps. dehiscent by twice as many teeth as there are styles: stipules 0: petals usually 2-cleft.  
 D. Styles usually 5: caps. cylindric, dehiscent by teeth. .... 8. CERASTIUM  
 DD. Styles usually 3: caps. ovoid or oblong, dehiscent by valves. .... 9. STELLARIA  
 CC. Caps. dehiscent into as many valves as there are styles: stipules small, scarious: petals entire. .... 10. SPERGULA

1. **HERNIARIA**, L. RUPTURE-WORT. More than 15 species of trailing herbs native in Eu., W. Asia, N. Afr., and the Canaries, and 1 species in S. Afr., growing in sandy places usually near the sea, one of which is grown for carpet-bedding, rock-gardens, and covering graves.—Annual or perennial with roots of short duration, prostrate, much-branched, glabrous or hirsute: lvs. small, sessile, with very small scarious stipules: fls. small, green, crowded in axillary fascicles; sepals 5; petals 0; stamens 5: fr. inclosed in the calyx; seed solitary. (Hernia-ria: from Greek *hernia*, referring to its supposed cure of rupture.)

**H. glabra**, L. A nodose perennial to 4–6 in. high, the sts. spreading along the ground several inches: lvs. oblong or rarely orbicular, glabrous except a few hairs at edges, of attractive color in winter: fls. sessile, in axillary clusters on the lateral branches, making a leafy spike. Eu., Asia.

2. **TUNICA**, Scop. About 20 species of annual or perennial slender wiry-stemmed herbs, native in the Medit. region, one of which is grown in flower-gardens.—Lvs. narrow: fls. in cymose panicles or heads, similar to *Dianthus* but smaller; calyx top-shaped or prismatic, obtusely 5-toothed, 5–15-nerved, conspicuously scarious between the green nerves, with scaly bracts at base or rarely naked; petals 5, long-clawed, limb emarginate or 2-cleft; stamens 10; styles 2: caps. ovoid or oblong, dehiscent by 4 valves. (Tu-nica: from Latin for *tunic* or coat, referring to the imbricated calyx.)

**T. Saxifraga**, Scop. Perennial to 10 in. high, tufted, spreading: lvs. narrow-linear, acute: fls. with pink or pale purple petals, summer-blooming; bracts acute, scarious-margined. Eu., adventive in E. U. S.—There are white-fl. and double-fl. vars.; has much the appearance of a saxifrage, whence the name.

3. **DIANTHUS**, L. PINK. Annual or mostly perennial herbs in cult., widely grown in gardens for their showy fls. and the carnation also under glass; probably about 200 species in the Medit. region, some extending through Siberia to arctic Amer. and to Japan and the Himalayas, a few through Abyssinia to the Cape.—Lvs. narrow, usually grass-like: fls. terminal, solitary or cymose-paniculate; calyx 5-toothed, cylindrical, with many fine nerves, subtended by 2 or more bracts; petals 5, long-clawed, entire, toothed or fringed; stamens 10; styles 2: caps. cylindric or oblong, dehiscent by 4 teeth or valves at apex. (Dianthus: from Greek for *flower of Jove*.)—The following six cultural groups of pinks may be distinguished for N. Amer.: (1) Annual flower-garden pinks (*D. chinensis*); (2) the carnation pinks (*D. Caryophyllus*), in N. Amer. known as a glasshouse plant, although the outdoor border kinds are somewhat grown; (3) the hardy grass pinks (*D. plumarius* and derivatives), very fragrant low tufted perennials, “the pink” of literature; (4) the maiden



pinks (*D. deltoides*), making broad mats, with many small fls., sometimes used for perennial borders and for colonizing; (5) the glomerate pinks, in which the fls. are in dense heads, the sweet william (*D. barbatus*) being the leading representative; (6) other miscellaneous pinks, grown now and then for variety, mostly by amateurs.

- A. Fls. in heads or dense clusters.  
 B. Lvs. broad and flat..... 1. *D. barbatus* (*D. latifolius*)  
 BB. Lvs. narrow, grass-like..... 2. *D. carthusianorum*  
 AA. Fls. solitary or loosely in 2's and 3's (if sometimes head-like, then not of same age).  
 B. Calyx-bracts leafy and spreading.  
 C. Plant to 18 in. high: fls. 1½–2 in. across..... 3. *D. chinensis*  
 CC. Plant 3–4 in. high: fls. ½–¾ in. across..... 4. *D. glacialis*  
 BB. Calyx-bracts not leafy and spreading.  
 C. Petals fimbriate (sometimes dentate in hybrid forms).  
 D. Teeth of calyx mucronate..... 5. *D. plumarius*  
 DD. Teeth of calyx acuminate.  
 E. Sts. simple..... 6. *D. fimbriatus*  
 EE. Sts. paniculate..... 7. *D. superbus*  
 CC. Petals only dentate (except perhaps in some garden forms).  
 D. Corolla (petals) with barbs or hairs.  
 E. Bracts 2, half length of calyx..... 8. *D. deltoides*  
 EE. Bracts 4, about one-third length of calyx..... 9. *D. cæsius*  
 DD. Corolla without hairs..... 10. *D. Caryophyllus*

1. *D. barbatus*, L. SWEET WILLIAM. Glabrous, from 1–2 ft. high, the sts. 4-angled, simple or branched only above: lvs. broad and flat, lanceolate to ovate-lanceolate, 5-nerved, green: fls. short-pedicelled, several to many in a round-topped dense cyme, odorless; petals contiguous, toothed and bearded; bracts 4, long-pointed, equaling the calyx. Russia to China, south to the Pyrenees; escaped in the E. U. S.—Runs into many colors as red, rose, purple, and white; there are also double-fl. kinds. There are several hybrids between this and other related species. *D. latifolius*, Hort., is intermediate between *D. barbatus* and *D. chinensis*. It grows to about 1 ft. high, becoming branched, with oblong-lanceolate lvs., double fls. 1 in. or more across, from 1–4 in a rather close head or cluster.

2. *D. carthusianorum*, L. Glabrous, from 10–16 in. high, the sts. 4-angled and simple: lvs. linear and pointed, green, rarely glaucous: fls. short-peduncled or sessile, odorless, in shades of red, in a dense 2–30-fl. head which is subtended by narrow or awl-like lvs.; petals irregularly toothed, often contiguous; bracts 4, broad and mucronate, shorter than calyx, yellowish or straw-colored. Denmark to Portugal and Egypt.

3. *D. chinensis*, L. (*D. sinensis*, Hort.). Glabrous, tufted, 12–18 in. high, creeping at base: sts. branching, angled and more or less grooved: lvs. linear-lanceolate, 3–5-nerved: fls. large, solitary or loosely clustered, red, lilac, or white, slightly fragrant; petals toothed (deeply cut in some hort. vars.), barbed or hairy toward the base; bracts 4, leafy and spreading, equaling the calyx (short in some cult. vars.). China and Japan to Portugal.—Runs into many cultivars. The most popular strain is var. *Heddewigii*, Regel, which is grown as an annual, having single or double fls. of vivid colors and often bizarre markings. (Named for Carl Heddewig, florist and horticulturist of Petrograd.) There are many forms with Latin names, and hybrids between *D. chinensis* and related species.

4. *D. glacialis*, Hænke. Glabrous, tufted, 3–4 in. high, the sts. 4-angled and simple, 1–2-fl.: lvs. linear, acute, green, 3-nerved, usually overtopping the fls.: fls. red, odorless; petals toothed, contiguous; bracts 2–4, equaling or exceeding the calyx, leafy and spreading. Mts. of S. Eu.—Var. *neglectus*, Williams (*D. neglectus*, Lois.), has deep rose usually single fls. with petals separate.

5. *D. plumarius*, L. COMMON GRASS or GARDEN PINK. Glabrous and glaucous, tufted, to 1 ft. high: sts. simple or branching above, 2–3-fl.: lvs. elongate-linear, keeled, spreading or recurved, thickish, 1-nerved, the margins scabrous: fls. showy, rose-colored (purple, white, and variegated in cult.), fragrant; petals not contiguous, bearded, the blade fringed a fourth or fifth of its depth; bracts 4, broad, mucronate, about one-third length of calyx; teeth of calyx mucronate. Austria to Siberia.—The common hardy named garden vars. of pinks are derivatives of this species, probably mostly of hybrid origin with *D. cæsius*, *D. Caryophyllus*, and others; the petals range from lacinate to entire.

6. *D. fimbriatus*, Bieb. Glabrous, suffruticose at base, rootstock dividing into many branches, to 16 in. high: sts. simple, slender, usually 1-fl.: lvs. linear,

appressed, 3-nerved, usually glaucous, the margins scarious: fls. rose-colored, variable; petals not contiguous, much fimbriated, bearded; bracts usually 4-8, closely appressed, one-third length of calyx; teeth of calyx acuminate. Portugal to Tibet.—There are many garden vars.

7. *D. superbus*, L. Glabrous, light green, 2 ft. or more high: sts. dichotomous and branched at top, graceful: lvs. linear-lanceolate, acute, 3-5-nerved, plane: fls. very fragrant, in a lax forking panicle, lilac; petals not contiguous, dissected below the middle, bearded; bracts 4, mucronate, appressed, about one-fourth length of calyx, straw-colored with membranaceous wings; teeth of calyx acuminate. Norway to Spain and Japan.—There are a number of garden forms.

8. *D. deltoides*, L. MAIDEN PINK. A densely tufted plant to 10 in. high, with attractive foliage and a profusion of small solitary fls. borne on the branched sts.: radical lvs. oblanceolate, obtuse; cauline lvs. linear-lanceolate, acute, the upper ones bract-like: fls.  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, fragrant, deep red with a crimson eye, the petals bearing an inverted V-shaped pocket at base (whence the name *deltoides*); petals not contiguous, toothed, bearded; bracts usually 2, narrow-pointed, half the length of the calyx. Scotland to Norway and Japan; adventive in E. U. S.—There is a white-fl. var.

9. *D. cæsius*, Sm. CHEDDAR PINK. Glabrous and glaucous, tufted, to about 10 in. high: sts. simple or branched above, 1-2-fl.: radical lvs. obtuse and plane, the cauline linear, acute, keeled, the margins scarious: fls. showy, fragrant, rose-colored; petals contiguous, bearded, irregularly toothed; bracts 4, about one-third length of calyx, mucronate. Mts. of Eu.—Runs into many forms and hybridizes with other species.

10. *D. Caryophyllus*, L. CARNATION. CLOVE PINK. PICOTEE. GRENADINE. Glabrous and glaucous, tufted, 1-3 ft. high: sts. branched, hard or almost woody below, with conspicuous nodes: lvs. thick, linear, obtuse, stiff at the ends, keeled, 5-nerved: fls. usually solitary, showy, very fragrant, long-peduncled, rose, purple, or white; petals contiguous, irregularly dentate, not bearded; bracts 4, very broad, mucronate, about one-fourth length of calyx; teeth of calyx acuminate. (*Caryophyllus*—whence clove pink—is an ante-Linnean substantive.) S. Eu. to India.—The carnation has been modified by cult. so that the fls. are very variable in size, form and color; numberless garden vars. are offered and it also hybridizes with related species. The American forcing type has very long sts. and is a continuous bloomer.

4. *GYPSOPHILA*, L. Annual and perennial herbs, grown in rock-gardens, borders, and as trimming for bouquets, of more than 60 species in Eu., Asia, and N. Afr.—Branching or diffuse, glaucous, with scant foliage when in bloom: fls. small and numerous, paniculate or axillary, white or rosy; calyx 5-toothed, conspicuously scarious between its green nerves, bractless, 5-nerved; petals 5, entire or emarginate, with narrow claws; stamens 10; styles 2; ovary with many ovules: caps. globose or ovoid, dehiscent by 4 valves extending to or below the middle. (*Gypsophila*: from Greek for *gypsum-loving*, referring to preference for calcareous soils.)

Plant tall, 2-3 ft. or more high.

Pedicels two to three times as long as calyx.....1. *G. paniculata*

Pedicels scarcely longer than calyx.....2. *G. acutifolia*

Plant lower, seldom over 16 in. high.

Lvs. linear: sts. very diffusely branched.....3. *G. muralis*

Lvs. lanceolate: sts. upright, forking.....4. *G. elegans*

Plant creeping, not over 6 in. high.

Lvs. pubescent on both surfaces.....5. *G. cerastioides*

Lvs. glabrous.....6. *G. repens*

1. *G. paniculata*, L. BABY'S-BREATH (also erroneously applied to *Galium Mollugo*). A tall-growing diffusely branched perennial to 3 ft. or more high: lvs. lanceolate, acute, the largest to 4 in. long, becoming smaller on the branches: fls. paniculate, white, the pedicels two to three times as long as calyx. Eu., N. Asia; escaped in few localities in N. Amer.—There is a double-fl. kind.

2. *G. acutifolia*, Fisch. Very similar to *G. paniculata*, differing in being less glaucous, the narrower indistinctly 3-nerved lvs. and the pedicels scarcely longer than calyx: fls. white or rosy. Caucasus.

3. *G. muralis*, L. A very diffusely branched annual from 6 in. to 1 ft. high: lvs. narrowly linear or subulate, attenuate at each end, longer than pedicels: fls.

solitary in the axils, on pedicels much longer than the calyx, the petals crenate, rosy. Eu.; adventive in E. U. S.

4. *G. elegans*, Bieb. Annual, 1-1½ ft. high, with upright forking sts., glabrous: lvs. lanceolate, acute, somewhat fleshy: fls. larger than in the preceding, white or rosy, long-pedicelled; petals emarginate, twice or more longer than calyx. Caucasus.

5. *G. cerastioides*, D. Don. A downy creeping perennial (cerastium-like, as the name implies) to about 4 in. high: lvs. pubescent on both surfaces, radical ones spatulate and long-petioled, the cauline obovate: fls. large, to ½ in. across, white with pink veins. Himalayas.

6. *G. repens*, L. (*G. prostrata*, Hort., not L.). Perennial to about 6 in. high, with trailing or prostrate sts., not glaucous: lvs. linear, glabrous: fls. rather large, in few-fl. panicles, white or rosy, the petals about twice longer than sepals. Alps and Pyrenees.

5. **SAPONARIA**, L. SOAPWORT. Annual and perennial herbs, of about 40 species, native in Eu., Asia, and N. Afr., a few of which are grown in rockeries and borders.—Habit erect or diffuse: lvs. broad and flat: fls. in dichotomous cymes; calyx ovoid- or oblong-tubular, obscurely nerved, 5-toothed, naked; petals 5, with narrow claws as long as calyx, the blade entire or emarginate; stamens 10; styles 2; ovary with many ovules: caps. ovoid or oblong, dehiscent by 4 teeth at apex. (*Sapona-ria*: Latin *soap*, the juice of some kinds forming a lather with water.)

Petals with an appendage at top of claw.

Plant tall and upright.....1. *S. officinalis*

Plant half-trailing, 6-9 in. high.....2. *S. ocymoides*

Petals not appendaged.....3. *S. Vaccaria*

1. *S. officinalis*, L. BOUNCING BET. Stout sparingly branched perennial to 3 ft. high, glabrous, leafy: lvs. ovate-lanceolate, 2-3 in. long, strongly 3-nerved: fls. short-peduncled, in dense terminal corymbs with many small floral lvs., pink or whitish, about 1 in. across; calyx terete; petals with appendage at top of claw, notched at apex. Eu., W. Asia; naturalized widely in N. Amer.—Many double-fl. kinds are advertised, one as var. *caucasica*, Hort.

2. *S. ocymoides*, L. A trailing much-branched perennial to 9 in. high, pubescent: lvs. ovate-lanceolate, 1-nerved: fls. in loose broad cymes, bright pink; calyx cylindrical, villous, purple; petals with appendage at top of claw. Cent. and S. Eu.—There are white-fl. vars.

3. *S. Vaccaria*, L. (*Vaccaria vulgaris*, Host). COW-HERB. A glabrous annual to 3 ft. high, branching above: lvs. ovate-lanceolate, connate at base, 1-nerved: fls. deep pink, long-peduncled, in loose corymbose cymes; calyx 5-angled, much inflated and wing-angled in fr., glabrous; petals without appendage, crenulate. Eu.; widely naturalized in N. Amer.—There is a white-fl. var.

6. **SILENE**, L. CATCHFLY. CAMPION. Over 400 species of annual and perennial herbs of wide distribution over the earth, some of which are grown in flower- and rock-gardens.—Of erect, tufted, decumbent or diffusely climbing habit: fls. solitary or in cymes, white, red, or pink; calyx 5-toothed or -cleft, ovoid, campanulate, cylindrical, often inflated, 10- to many-nerved, naked at base; petals 5, with narrow claw, usually crowned with a scale at the base of the blade; stamens 10; styles usually 3; ovary many-ovuled: pod dehiscent by 6, rarely 3, teeth at apex. (*Sile-ne*: from Greek for *saliva*, referring to the stickiness of st. and calyx of some species.)

Plants not dwarf, erect, height 1 ft. or more.

Lvs. ovate-lanceolate, from a subcordate clasping base.

Fls. in peduncled compound cymes.....1. *S. Armeria*

Fls. in sessile dense heads.....2. *S. compacta*

Lvs. lanceolate to narrowly linear, attenuate at base.....3. *S. laciniata*

Plants dwarf, diffuse, prostrate or tufted, height 2-10 in. or rarely more.

Calyx glabrous, much inflated.....4. *S. maritima*

Calyx hirsute, only slightly if at all inflated.

Tube of calyx 1 in. long.....5. *S. Schafta*

Tube of calyx shorter.

Lvs. ovate-lanceolate: fls. pink.....6. *S. pendula*

Lvs. lanceolate to linear: fls. white.....7. *S. alpestris*

1. *S. Armeria*, L. SWEET WILLIAM CATCHFLY. Erect branching annual from 1-2 ft. high, glabrous or minutely puberulent, glaucous: lvs. ovate-lanceolate, 1-3 in. long, subcordate and clasping at base: fls. in terminal peduncled compound cymes, pink or rose, short-pedicelled; calyx club-shaped, 10-nerved; petals emarginate, crowned with narrow scales. S. Eu.; adventive in E. U. S.—There is a white-fl. var.

2. *S. compacta*, Fisch. (*S. orientalis*, Hort.). Glabrous and glaucous biennial from 1-2 ft. high, simple or slightly branched above: upper lvs. broadly ovate, clasping, 1-2 in. long, lower lvs. oblong-lanceolate: fls. pink, in a dense sessile head, the upper lvs. involucrate; calyx club-shaped, 10-nerved; petals entire, crowned with 10 linear scales or rays. E. Eu., Asia Minor.

3. *S. laciniata*, Cav. Pubescent perennial from 1-3 ft. high, with erect or decumbent much-branched sts.: lvs. lanceolate-linear, attenuate to a sessile base, acute: fls. large, terminal or axillary on 1-fl. peduncles, somewhat nodding, bright red; calyx cylindrical or club-shaped, 10-nerved; petals 4-cleft, much exceeding the calyx. Mex., S. Calif.—There is a dwarf var. with cardinal-red fls.

4. *S. maritima*, With. A diffuse perennial from 8-12 in. or perhaps more high, glaucous: lvs. lanceolate, acute, glabrous: fls. 1-4 to a st., white; calyx campanulate, glabrous, much inflated after anthesis, 20-nerved; petals 2-cleft with 2 small scales at base. Eu.—Chiefly cult. in its var. *plena*, which grows 4-10 in. high, has much larger and extremely double fls.

5. *S. Schafta*, Gmel. Pubescent perennial from 3-6 in. high: sts. simple or slightly branched, arising laterally from the rosettes of small oblanceolate to spatulate lvs.: peduncles axillary or terminal, 1-2-fl.; fls. rose or purple; calyx somewhat hirsute, reddish, long-cylindrical, not inflated, 10-nerved; petals notched, with 2 scales at base. (Schafta: probably a geographical name.) Caucasus.

6. *S. pendula*, L. Pubescent annual to 10 in. high, with sts. decumbent at base, branched above: lvs. ovate-lanceolate: fls. axillary, becoming pendulous, flesh-colored, on peduncles shorter than the calyx; calyx hirsute, 10-nerved, somewhat inflated after anthesis; petals 2-parted, crowned. Medit. region.—There are numerous color vars. and also those with double fls.

7. *S. alpestris*, Jacq. A compact perennial to 6 in. high with simple sts., more or less viscid above: lvs. lanceolate-linear, rather obtuse: fls. rather large, white, shining, paniculate; calyx hirsute, short, campanulately club-shaped, 10-nerved, not inflated; petals 4-lobed, with 2 teeth at base. Mts. of E. Eu.

7. **LYCHNIS**, L. About 40 species of annual and perennial herbs of the north temp. and arctic zones, some of which are grown in flower-gardens.—Mostly erect-growing: calyx 5-toothed, 10-nerved, ovoid, tubular or inflated, naked at base; petals 5, narrow-clawed, the blade entire, 2-cleft or lacinate, usually crowned; stamens 10; styles 5, rarely 4, alternate with petals; ovary many-ovuled: caps. dehiscent at apex with 5 or 10 teeth. (Lych-nis: from Greek for *lamp*, referring to the flame-colored fls. of some species.)—Very closely allied to *Silene* and by some authors also separated into several genera.

A. Plant white-woolly throughout.

B. Fls. solitary, 1 in. across. . . . . 1. *L. Coronaria*

BB. Fls. in dense clusters, ½ in. across. . . . . 2. *L. Flos-Jovis*

AA. Plant not white-woolly, although perhaps hairy.

B. Lvs. linear or narrowly lanceolate.

C. Fls. solitary. . . . . 3. *L. Cali-rosa*

CC. Fls. in dense terminal heads. . . . . 4. *L. alpina*

CCC. Fls. in loose panicles.

D. Petals 2-notched. . . . . 5. *L. Viscaria*

DD. Petals 4-parted. . . . . 6. *L. Flos-cuculi*

BB. Lvs. broader, on the ovate or oval order.

C. Fls. in dense terminal heads.

D. Petals 2-cleft, fls. about 1 in. broad. . . . . 7. *L. chalconica*

DD. Petals 4-cleft, fls. larger. . . . . 8. *L. fulgens*

CC. Fls. in loose panicles or 2-3 together.

D. Petals 2-cleft.

E. Color of fls. white, opening at evening. . . . . 9. *L. alba*

EE. Color of fls. usually red, opening in the morning. . . . . 10. *L. dioica*

DD. Petals several-toothed.

E. Plant glabrous. . . . . 11. *L. coronata*

EE. Plant somewhat hairy. . . . . 12. *L. Haageana*

1. *L. Coronaria*, Desr. (*Agrostemma Coronaria*, L.). MULLEIN-PINK. DUSTY MILLER. ROSE CAMPION. A densely white-woolly biennial or perennial from 1-3



ft. high: lvs. oval or oblong, lower ones narrowed into petiole, upper sessile: fls. terminal, solitary, long-peduncled, 1 in. or more across, crimson; calyx somewhat campanulate, with filiform twisted teeth; petals emarginate, with appendages at throat. (Coronaria: Latin for *garland*; but in this case an old substantive for this plant, used here in apposition.) S. Eu.; escaped in N. Amer.—Runs into double-fl. vars. and white and dark crimson fls.

2. **L. Flos-Jovis**, Desr. (*Agrostemma Flos-Jovis*, L.). FLOWER-OF-JOVE (as the Latin name implies). White-tomentose perennial from 1-1½ ft. high: lvs. oval-lanceolate, somewhat clasping, both rosulate and cauline: fls. in dense umbel-like clusters, ½ in. or less across, pink, pedicels shorter than calyx; petals 2-lobed. Mts. of S. Eu.

3. **L. Cœli-rosa**, Desr. (*Agrostemma Cœli-rosa*, L.). ROSE-OF-HEAVEN (indicated in the specific name). Glabrous floriferous annual from 1-1½ ft. high: lvs. linear, long-acuminate and very sharp pointed: fls. solitary, terminal, almost 1 in. across, rose-red; calyx club-shaped with filiform teeth; petals slightly notched, with linear bifid scale at throat. Medit. region.—There is a white-fl. var. and one with deeply toothed petals.

4. **L. alpina**, L. (*Viscaria alpina*, Don). A glabrous tufted perennial 1 ft. or less high: lvs. linear-lanceolate, forming dense rosette, st.-lvs. few: fls. small, in dense terminal heads, short-peduncled, pink; calyx campanulate with short rounded teeth; petals 2-lobed, appendages minute. Arctic and alpine regions in Eu., Asia, N. Amer.

5. **L. Viscaria**, L. (*Viscaria viscosa*, Aschers.). GERMAN CATCHFLY. Perennial blooming in May and June, from 6-20 in. high, glabrous but with viscid patches beneath the fl.-clusters: lvs. long-linear, the lower ones tapering toward the base: fls. in opposite short-stalked clusters forming an interrupted glomerate panicle, red or purple; calyx somewhat swollen above middle; petals slightly 2-notched. Eu., N. Asia.—There are double-fl. kinds, also a var. with white fls.

6. **L. Flos-cuculi**, L. (*Agrostemma Flos-cuculi*, Don). RAGGED ROBIN. CUCKOO-FLOWER (indicated in the name). A slender profusely blooming perennial to 2 ft. high, pubescent below, viscid above: lvs. narrowly lanceolate, the upper ones small and sessile: fls. in loose panicles, red or pink; calyx short-oblong; petals cut into 4 linear segms. Eu., N. Asia; naturalized in E. U. S.—There are double-fl. and white vars.

7. **L. chalconica**, L. MALTESE CROSS. Perennial to 3 ft. high, with simple or slightly branched sts., usually loose-hairy: lvs. ovate or the upper lanceolate, rounded or cordate at base, usually clasping: fls. in dense terminal heads, scarlet, about 1 in. across; calyx oblong, enlarging in fr.; petals 2-cleft. Russia and Siberia; adventive in some localities in E. U. S.—There are vars. with white or flesh-colored fls. and also double kinds.

8. **L. fulgens**, Fisch. Erect-stemmed hairy perennial from 1-2 ft. high: lvs. ovate to ovate-oblong, hairy, tapering below: fls. few, in dense terminal clusters, bright scarlet; calyx oblong or ovate, woolly; petals divided into 2 broad slightly toothed lobes, on the outer side of which are 2 very narrow lobes. Siberia.

9. **L. alba**, Mill. (*L. vespertina*, Sibth.). EVENING CAMPION. A freely-branching biennial or perennial to 2 ft. high, viscid-pubescent: lvs. ovate-lanceolate or oblong, the lower tapering into a margined petiole: fls. few in loose panicles, usually white and fragrant, opening in the evening, often dioecious; calyx enlarging in fr.; petals 2-cleft, crowned: teeth of caps. erect. Eu.; adventive in E. U. S.

10. **L. dioica**, L. RED or MORNING CAMPION. Similar to the above, but differing in the usually red odorless fls. opening in the morning, shorter calyx and the teeth of the caps. recurved. Eu. and Asia; adventive in E. U. S.—There are double-fl. sorts.

11. **L. coronata**, Thunb. (*L. grandiflora*, Jacq.). Erect glabrous biennial or perennial to 1½ ft. high: lvs. oval-elliptic, acute, sessile or nearly so: fls. scattered or in an open panicle, very large, 2 in. or more across, brick-red, salmon or cinnabar; petals laciniately-toothed. China, Japan.—Var. *Sieboldii*, Bailey, has large pure white fls. Runs into many other forms.

12. **L. Haageana**, Lem. (*L. fulgens* × *L. coronata* var. *Sieboldii*). A somewhat hairy perennial to 1 ft. high, intermediate in characters between the parents: fls. in 2's or 3's, about 2 in. across; petals with 2 large dentate lobes and 2 short side teeth, orange-red, scarlet, or crimson; calyx hairy.—There are several cultivars and also a hybrid with *L. chalconica*, **L. Arkwrightii**, Hort., with fls. in shades of scarlet.

8. **CERASTIUM**, L. MOUSE-EAR CHICKWEED. Annual or perennial herbs, a few species grown for edgings and in rock-gardens; species variable, probably about 50 but by some authors described as 100, of world-wide distribution, most abundant in temp. zones.—Usually pubescent or hirsute: fls. white, in terminal dichotomous cymes; sepals 5, rarely 4; petals as many, usually emarginate or 2-cleft, rarely wanting; stamens 10 or fewer; styles 5, rarely 4 or 3, opposite the sepals: caps. cylindric, many-seeded, dehiscent at apex by twice as many teeth as there are styles. (Ceras-tium: Greek for *horn*, alluding to the shape of the pod.)

|  |                            |
|--|----------------------------|
| Foliage green.....   | 1. <i>C. arvense</i>       |
| Foliage grayish-tomentose.   |                            |
| Lvs. $\frac{1}{2}$ – $\frac{3}{4}$ in. long, about $\frac{1}{8}$ in. wide..... | 2. <i>C. tomentosum</i>    |
| Lvs. 1–1 $\frac{1}{2}$ in. long, about $\frac{1}{8}$ in. wide.....             | 3. <i>C. Biebersteinii</i> |

1. **C. arvense**, L. STARRY GRASSWORT. Densely tufted perennial 4–10 in. high, with erect or ascending sts.: lvs. linear or narrowly lanceolate,  $\frac{1}{2}$ –1  $\frac{1}{2}$  in. long, about  $\frac{1}{8}$  in. wide: fls. numerous, blooming in Apr. and May; petals deeply bifid, more than twice the length of calyx: caps. one-third or more longer than calyx. Wide-spread in N. Amer., also Eu. and Asia.

2. **C. tomentosum**, L. SNOW-IN-SUMMER. Diffuse perennial with creeping sts., from 3–6 in. high, grayish-tomentose: lvs. linear-lanceolate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, about  $\frac{1}{8}$  in. wide: fls. rather large, blooming in early summer, pedicels two to three times longer than calyx: caps. longer than calyx. Eu.

3. **C. Biebersteinii**, DC. Very similar to *C. tomentosum* but with larger lvs. averaging 1–1  $\frac{1}{2}$  in. long and about  $\frac{1}{8}$  in. wide, and the larger fls. and fr. (Named after F. A. M. von Bieberstein, 1766–1826, Russian botanist.) Mts. of Asia Minor.

9. **STELLARIA**, L. More than 80 species of herbs scattered all over the world but chiefly in temp. regions, the following grown in borders and for ground-cover.—Usually diffuse, tufted: fls. white, in terminal leafy or naked cymes, rarely axillary or solitary; sepals 5, rarely 4; petals as many as sepals, usually 2-cleft; stamens 10 or fewer; styles 3, rarely 4 or 5 and then alternate with sepals: caps. globose, ovoid or oblong, many-seeded, dehiscent beyond the middle by twice as many valves as there are styles. (Stella-ria: Latin *star*, referring to the shape of the fls.)

**S. Holostea**, L. Erect perennial from a creeping rootstock, 6 in.–2 ft. high, with simple or somewhat branched sts., glabrous or somewhat downy: lvs. sessile, lanceolate, 1–3 in. long, ciliate on midvein and margins: fls.  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, blooming in May and June; sepals one-half to two-thirds length of petals. (Holostea: old Greek name of a plant.) Eu., N. Asia; sparingly adventive in E. U. S.

10. **SPERGULA**, L. Two or 3 or possibly more species of annual herbs native in temp. regions of the world: one species, the spurry, cult. for forage on poor sandy soils and as a green-manure crop.—Lvs. subulate, with small scarious stipules, much fascicled in the axils: fls. white, in terminal cymes, pedicelled; sepals 5; petals 5, entire; stamens 10 or 5; styles 5, alternate with sepals: caps. many-seeded, 5-valved, the valves opposite the sepals. (Spergula: Latin *to scatter*.)

**S. sativa**, Boenn. SPURRY. Dull green, viscid, 6–18 in. tall: lvs. linear, clustered at nodes in 2 opposite sets of 6–8 together, appearing as if verticillate: fls. small, numerous: seeds margined, with obscure dots but not papillate. Eu.; sparingly adventive in E. U. S.—**S. arvensis**, L., differs in being bright green, not viscid, and the seeds with whitish papillæ.

#### 54. NYMPHÆACEÆ. WATER-LILY FAMILY

Aquatic herbs, mainly with floating foliage, of which 8 genera are recognized and 50–60 species in many parts of the world; many of them are highly ornamental.—Perennial, often with large horizontal rootstocks in the mud: lvs. very various, in most species large and simple and rising directly from the

rootstock, in others from floating sts. (as in *Cabomba*) and then usually small and perhaps dissected: fls. usually bisexual, large or small, floating or upstanding high above the water, regular; sepals commonly 4, sometimes more but not numerous; petals few in *Cabomba* and *Brasenia*, but otherwise many or even indefinite and commonly showing transition to stamens which are then also numerous; ovaries few and distinct, but mainly many: fr. formed of the separate indehiscent carpels, or usually (as in the true water-lilies) of many adnate carpels indicated by the rayed marks of stigmas or (as in the *Nelumbos*) of several carpels immersed in a greatly enlarged spongy torus and open by large holes at the tops.—Aside from the genera here described, the native *Cabomba caroliniana*, Gray, is often sold for aquaria and fish-ponds under the name of Fish-Grass and Washington Plant; it has very narrow floating lvs. and much dissected submerged lvs. The native *Brasenia Schreberi*, Gmel. (*B. peltata*, Pursh), Watershield, is sometimes planted in ponds. The Cow-Lily or Spatter-Dock, the native *Nymphaezanthus advena*, Fernald (*Nuphar advena*, Ait. f.), with stiff fls. above the water and upstanding lvs. is sometimes colonized.

Lvs. mostly floating, or not standing more than a few inches out of water.

Plants not prickly: lvs. flat or plane at margin.....1. NYMPHÆA

Plants very prickly or spiny: lvs. turned up at edge.....2. VICTORIA

Lvs. standing high above the water.....3. NELUMBUM

1. **NYMPHÆA**, L. (*Castalia*, Salisb.). **NYMPHÆA. WATER-LILY.** Widely distributed in temp. and trop. regions, about 40 species and numerous hort. hybrids.—Rootstocks horizontal or erect, sometimes tuberous: lvs. usually floating, orbicular or oval, often cordate, sometimes peltate near the margin but not centrally, entire, sinuate or toothed, often colored beneath: fls. usually showy, often large, floating or standing near the surface but the fr. under water, in many colors, some kinds blooming by day and others at night; sepals 4; petals and stamens many, not soon caducous: fr. a single compound body of many carpels with a depressed saucer-like center and radiating style-processes. (Nymphæ-a: Nymphæ, the water-nymphs.)—The hort. nymphæas are largely hybrids and some of the named kinds cannot be definitely placed botanically; but the main species of importance to the cultivator are included here. The Marliac vars. (*N. Marliacea*, Hort.) are of various origins, but probably issue mostly from *N. alba* and var. *rubra*, although some of them apparently have *N. mexicana* and other influence; raised by M. Latour-Marliac, France.

- A. Carpels free or separated on the sides of the compound fr., united to the center by their inner edges: **APOCARPIÆ.**
  - B. Lvs. entire, or only slightly undulate at base.....1. *N. cærulea*
  - BB. Lvs. distinctly, often deeply, sinuate.
    - c. Sepals bearing black dots and lines.....2. *N. stellata*
    - cc. Sepals without such markings.
      - d. Basal angles of lvs. long and acuminate.....3. *N. capensis*
      - DD. Basal angles rounded (see also var. of No. 3).....4. *N. flavovirens*
- AA. Carpels wholly united. **SYNCARPIÆ.**
  - B. Sepals conspicuously veined: lvs. strongly dentate.
    - c. Fls. white.....5. *N. Lotus*
    - cc. Fls. pink or red.....6. *N. rubra*
  - BB. Sepals not evidently or prominently veined: lvs. not at all or only obscurely dentate.
    - c. Fls. white, pink or rose-colored.
      - d. Lvs. crowded on the rhizome.....7. *N. alba*
      - DD. Lvs. scattered loosely on the rhizome.
        - e. Under side of lvs. purplish.....8. *N. odorata*
        - EE. Under surface green.....9. *N. tuberosa*
    - cc. Fls. yellow.....10. *N. mexicana*

1. ***N. cærulea***, Sav. **BLUE LOTUS** of Egypt. Not showy, but blooming freely: lvs. oval, narrowly peltate, 12–16 in. across, at base entire or slightly sinuate, under surface green with purple blotches: fls. 3–6 in. across, light blue with dull white in

center, opening three days in forenoon; petals 14–20, lanceolate-acute; stamens 50 or more. N. and Cent. Afr.—*N. pennsylvanica*, Conard, a good blue, is a hybrid between this species and *N. capensis* var. *zanzibariensis*.

2. *N. stellata*, Willd. BLUE LOTUS of India. Lvs. elliptic-orbicular, rather broadly peltate, irregularly repand-dentate, the basal lobes scarcely lengthened, blue-violet beneath: fls. 3–7 in. across, pale blue, whitish in bottom (pink and white races are known but apparently not in cult. here), opening three days in forenoon and early afternoon; petals 11–14; stamens 33–54. India.

3. *N. capensis*, Thunb. CAPE BLUE WATER-LILY. Lvs. orbicular-ovate, 12–16 in. across, rather narrowly peltate, strongly sinuate-dentate, basal lobes produced and acuminate: fls. 6–8 in. across, sky-blue, whitish in bottom, opening four days in forenoon to late afternoon; petals 20–30, narrow-elliptic; sepals whitish within; stamens about 150. S. Afr.—Var. *zanzibariensis*, Casp. (*N. zanzibariensis*, Casp.). Variable and inconstant from seeds: lvs. tending to orbicular (as well as orbicular-ovate), the basal angles scarcely pointed, closely sinuate-dentate, often smaller: fls. often larger (to 12 in. across), opening and closing three to five days somewhat later; sepals purple-blue within and on margins; stamens often or usually more numerous. Zanzibar.

4. *N. flavovirens*, Lehm. (*N. gracilis*, Hort., not Zucc.). Lvs. nearly orbicular, narrowly peltate, 15–17 in. across, nearly entire or deeply and irregularly sinuate, basal angles rounded, green underneath: fls. 6–8 in. across, white; petals 16–20, acuminate; sepals green; stamens about 60, deep yellow. Mex.

5. *N. Lotus*, L. WHITE LOTUS of Egypt. Lvs. orbicular, 12–20 in. across, sharply toothed, basal lobes not projecting, dark green on top and brownish beneath, smooth or slightly pubescent: fls. 5–10 in. across, white with outer petals pinkish, opening evening till nearly next noon; petals 19 or 20, broad and concave; sepals green, with 10–16 creamy-white veins; stamens 96 or more, yellow, the filaments longer than anthers. Egypt.—Var. *dentata*, Schum. & Thonn. Fls. pure white, 8–10 in. across, open till past noon; petals narrower, ovate, becoming horizontal; filaments shorter than anthers: lvs. glabrous, or somewhat puberulent beneath. Cent. Afr.

6. *N. rubra*, Roxb. Lvs. orbicular or nearly so, 12–18 in. across, sharply dentate, basal lobes not projected, bronzy reddish-brown but becoming greenish, pubescent beneath: fls. 6–10 in. across, deep purplish-red, opening three or four nights till nearly noon; petals 12–20, narrow-oval, blunt; sepals purplish-red and prominently 7-nerved, never full expanding; stamens about 55, cinnabar-red or brownish. India; there are many hort. derivatives, as *N. Arnoldiana*, *Bissetii*, *columbiana*, *Deaniana*, *devoniensis*, *indica* vars., *keuensis*, *Omarana*, *rubicunda*, *Sturtevantii*.

7. *N. alba*, L. EUROPEAN WHITE WATER-LILY. A strong robust species with lvs. crowded on the black rhizome: lvs. roundish, 4–12 in. across, entire, red when young: fls. white, 4–5 in. across, open nearly all day; petals broad, ovate, somewhat concave. Eu. and N. Afr.—Var. *rubra*, Lönnr. Fls. rosy-red, with anthers and stigma yellow. Sweden. *N. alba* var. *rubra* has apparently contributed largely to cultural hybrids: *N. Robinsoni*, *Andreana*, *aurora*, *chrysantha*, *Laydekeri*, *formosa*, and others, represent crosses with *N. odorata*, *N. mexicana*, *N. tetragona*.

8. *N. odorata*, Ait. FRAGRANT WATER-LILY. Rootstock continuous, little branching, not tuber-bearing: lvs. orbicular or oblong-orbicular and entire, 3–10 in. across, with sinus nearly or quite half depth of blade, rather thick, dull green above and mostly purplish beneath: fls. white, 3–5 in. across, very fragrant, opening three days in the forenoon; petals 23–32, ovate or narrower; sepals tinged brown; stamens 55 to more than 100, yellow. Common in E. U. S., yielding garden forms; in the wild it is represented at Cape Cod by a pink-fl. var. (var. *rosea*, Pursh) and in the S. and American tropics by a larger white-fl. var. (var. *gigantea*, Tricker). Numbers of hybrids and derivatives have been produced, as *N. caroliniana*, *Luciana*, *speciosa*, *superba*. Another white-fl. water-lily that has entered into garden races is *N. tetragona*, Georgi, of N. Ida. and Ont., and also Siberia to Japan. It is the smallest of the species in cult. and is known chiefly in its contribution to the Marliacea and Laydekeri and other hybrids: the species has an erect short rhizome, entire horse-shoe-shaped lvs. reddish beneath and fls. 2½ in. or less across open three or four days from noon to 5 P.M.

9. *N. tuberosa*, Paine. TUBEROUS WATER-LILY. Rootstock bearing detachable short tuber-like branches: lvs. mostly larger than in No. 8, not purplish or red beneath: fls. usually larger, 4–9 in. across, pure white, opening three to four days till shortly after noon, with faint or no fragrance; petals broad and concave; sepals green. N. and Cent. U. S.—Var. *Richardsoni*, Conard, has more numerous petals. The species has entered into garden hybrids.



10. *N. mexicana*, Zucc. **YELLOW WATER-LILY.** Spreading by runners, the rootstock erect and tuber-like: some of the lvs. stand above the water when crowded; floating lvs. ovate, 4-8 in. across, obscurely and finely sinuate, dark green and blotched brown above, crimson-brown with blackish dots beneath: fls. 4 in. across, standing 4-5 in. above the water, bright yellow, open before midday and early afternoon; petals about 23, passing gradually into the 50 yellow stamens. Fla., Mex., but hardy *N.* under cult.

2. **VICTORIA**, Lindl. Probably 3 species in S. Amer., known for the great size of the floating lvs. and for the large fragrant fls.—Perennial, with erect rhizome: peduncles, petioles, under side of fls. and calyces very prickly: lvs. circular, with great bars and cross-ribs showing beneath, the margins turned up straight 3-8 in.: fls. 6-18 in. across when open, floating, opening late in the afternoon and remaining till the second day, changing from white to pink and red, fragrant; petals 50 or more, oblong or narrower, obtuse; sepals 4; stamens 150 or more; inside the stamens a deep cup is formed by about 25 paracarpels; true carpels 30-40; stigma in the bottom of the fl., 2-2½ in. broad: fr. a large more or less berry-like body crowned by the remains of the torus-tube. (*Victo-ria*: dedicated to Queen Victoria.)

Sepals prickly nearly or quite to tips: lvs. scarcely pubescent beneath . . . . . 1. *V. regia*

Sepals prickly only at base: lvs. densely villous beneath. . . . . 2. *V. Cruziana*

1. *V. regia*, Lindl. Lvs. 3-6 ft. across, only sparingly pubescent beneath, in the larger lvs. turned up 2-4 in. at the edges, reddish beneath, turning dull crimson second day; sepals prickly nearly or quite to the tips, the spines about ¼ in. or less long (6-8 mm.); ovary with prickles about ½ in. long: seed elliptic-globose, nearly ½ in. long, with indistinct raphe. British Guiana and the Amazon.—Var. *Randii*, Sturt., the usual form of *V. regia* in cult., has higher lf.-rim (5-6 in.) and under side deeper red, the fl. turning deep crimson second day. British Guiana.

2. *V. Cruziana*, d'Orb. (*V. Trickeri*, Hort.). Lvs. densely villous beneath, the upturned margins green and 6-8 in. high: fls. turning deep red-pink second day; sepals prickly only at base; ovary with longer prickles, ½ in. and more: seeds nearly globose, about ½ in. long, with prominent raphe. Paraguay; apparently the kind now in cult. in N. Amer., although it may be called *V. regia*; it bears the name of General Santa Cruz.

3. **NELUMBIUM**, Juss. (*Nelumbo*, Adans.). Species probably 3: *N. luteum*, Willd., native in the U. S., and *N. jamaicense*, DC., Jamaica, perhaps not separable from it; and the East Indian Lotus.—Stout large plants with peltate shield-like lvs. mostly standing on high stout petioles, and single large fls. on peduncles usually overtopping the lvs.: sepals 4 or 5; petals and stamens many, caducous: carpels many, immersed in the large nearly flat-topped receptacle, each opening on top by a large hole; frs. size of small hazelnuts. (*Nelum-bo*: name in Ceylon.)

*N. Nelumbo*, Druce (*N. speciosum*, Willd. *Nelumbo nucifera*, Gaertn.). **EAST INDIAN LOTUS.** Rootstock bearing small scale-like lvs., many ft. long and an article of food in some countries: most of the lvs. high (3-6 ft.) above the water, the blade orbicular and centrally peltate, entire, 1-3 ft. across, glaucous: fls. 4-10 in. across, fragrant, pink or rose, with variants to white and dark red, sometimes striped; also double-fl'd. forms as well as dwarf races. S. Asia to Australia; sometimes naturalized; one of the most striking plants in cult., in many named vars. The Egyptian lotus is a nymphaea.

## 55. TROCHODENDRACEÆ. TROCHODENDRON FAMILY

Three genera and about 6 species of trees and shrubs, native in E. and Cent. Asia, little known in cult.—Lvs. alternate or opposite, glandular-toothed: fls. solitary or in racemes in the axils of the bud-scales, bisexual or unisexual, hypogynous or perigynous, without sepals or petals; stamens numerous, spirally arranged; carpels separate, 2-many in a whorl, sometimes half immersed in the receptacle, ovules many or only 1: fr. a follicle or achene.

**CERCIDIPHYLLUM**, Sieb. & Zucc. One species in Japan and W. China, grown for its handsome foliage and interesting upright form.—Lvs. usually opposite, deciduous, slender-petioled, cordate, orbicular or broadly ovate, palmately-nerved, obtuse, crenate-serrate: fls. solitary, diœcious, appearing before the lvs.; staminate nearly sessile; pistillate pedicelled, of 3-5 carpels ending in long purplish styles: fr. a dehiscent pod about  $\frac{3}{4}$  in. long, bearing many seeds. (Cercidiphyl-lum: *Cercis* and *phyllon*, leaf; the lvs. resemble those of *Cercis*.)

**C. japonicum**, Sieb. & Zucc. Bushy tree of pyramidal habit, 20-30 ft. high but sometimes to 100 ft., usually with several trunks: lvs. purplish when young, turning bright yellow or partially scarlet in fall.

## 56. RANUNCULACEÆ. CROWFOOT FAMILY

Mainly herbs, sometimes little shrubs and woody climbers, mostly in the temp. and arctic regions of the northern hemisphere, many of them favorite flower-garden subjects; genera probably 30 or more, and species perhaps 1,200.—Typically defined as plants with all the floral parts present, regular, free and distinct; to this definition, however, there are many exceptions: in some cases the petals are lacking and the sepals are petaloid; in others the petals and sepals are spurred, making specialized nectaries; in still others (as *Nigella*) the carpels are more or less united. In general, the sepals are 3-15; petals, if present, of similar number; stamens usually many, hypogynous: pistils few or many, superior: fr. an achene or follicle, sometimes a berry: lvs. alternate or opposite, petiole with dilated base, blade simple or compound.—Some of the native species are more or less planted, as *Actæa*, the Baneberry, woods plants, one with red and another white berry-like frs.; *Caltha*, the Marsh-Marigold or "Cowslip" of Amer., a swamp plant with glowing yellow bloom in early spring; *Coptis*, Goldthread, medicinal; *Hydrastis*, Goldenseal, medicinal; *Hepatica*, Liverleaf, of which there are double-fl. and named forms abroad. Details of structure are shown in Fig. 9, page 258. In *Hepatica*, *I*, sometimes transferred to grounds, the colored parts are sepals and the sepal-like parts are involucre, as may be learned by studying related plants. The regular flower of *Anemone* is shown at *K*, and very irregular flowers at *J* and *M*. A unisexual flower of *Thalictrum* is at *L*.

- A. Blossoms small or medium size, often irregular, mostly variously clustered.
- B. Fr. an achene, the carpels 1-ovuled.
- C. Lvs. alternate, or if opposite making an involucre-like formation: sepals imbricated (overlapped) in the bud.
- D. Fls. without involucre subtending them.
- E. Petals present and showy, bearing a nectar-pit or -scale at base.
- EE. Petals present but without nectary.
- EEE. Petals none: fls. small and very numerous.
- DD. Fls. with subtending involucre, which sometimes simulates a calyx.
- CC. Lvs. opposite: sepals valvate (edge to edge) in bud.
- BB. Fr. a follicle or berry, the carpels with more than 1 ovule (all but 1 suppressed in No. 10 when in fr.).
- C. Fls. regular, without spurs, with subtending involucre.
- D. Plant with scape-like st. bearing single fl.
- DD. Plant branching, fls. several to many.
- CC. Fls. regular, without spurs or involucre.
- D. Lvs. palmately nerved or compound.
- E. Petals flat, pitted above the base.
- EE. Petals tubular, much shorter than sepals.
- DD. Lvs. pinnately or ternately compound.
- E. Fr. a caps. (of several carpels).
- EE. Fr. a 1-seeded pod or follicle: low shrub.
- EEE. Fr. a many-seeded pod: tall herbs.
- CCC. Fls. regular, the petals produced into long spurs.
- CCCC. Fls. very irregular.
- D. Upper sepal spurred, inclosing the spurs of upper pair of petals

- 1. RANUNCULUS
- 2. ADONIS
- 3. THALICTRUM
- 4. ANEMONE
- 5. CLEMATIS
- 6. ERANTHIS
- 7. NIGELLA
- 8. TROLLIUS
- 9. HELLEBORUS
- 7. NIGELLA
- 10. ZANTHORHIZA
- 11. CIMICIFUGA
- 12. AQUILEGIA
- 13. DELPHINIUM

- DD. Upper sepal hooded, covering a pair of small long-clawed but not spurred sepals.....14. ACONITUM  
 AA. Blossoms very large (3 in. or more across), wide-opening, regular, mostly solitary; fr. of separate many-seeded follicles on a fleshy disk.....15. PÆONIA

1. **RANUNCULUS**, L. BUTTERCUP. CROWFOOT. A wide range of herbs, perhaps 300 species, widely dispersed in temp. and cold countries, some of them weedy and a few grown for the ornamental bloom.—Annual and perennial, with alternate entire or compound lvs., plant erect, creeping, or aquatic and floating, root sometimes tuberous: fls. solitary on the ends of st. or many branches or sometimes more or less corymbd or panicle, rarely sessile, mostly yellow; sepals and petals usually 5, sometimes fewer, petals sometimes more numerous; petals with a nectary at base; stamens mostly many, short; pistils many, ripening into small hard achenes clustered on the torus to form a little head. (Ranunculus: Latin word for a *little frog*, alluding to the habitat—in ponds and wet places—of many of the species.)—The following are perennial and usually double-fl. in cult. forms; often known as “bachelors buttons.”

Plant creeping, rooting at nodes.....1. *R. repens* var.  
 Plant erect.

Sts. nearly or quite simple: fls. few.....2. *R. asiaticus*

Sts. much branched: fls. many.

Fl.-bud (sepals) glabrous or nearly so: achene nerved on sides.....3. *R. aconitifolius*

Fl.-bud (sepals outside) hairy: achene not nerved.....4. *R. acris*

1. *R. repens*, L., var. *pleniflorus*, Fernald. DOUBLE-FLOWERED CREEPING BUTTERCUP. Vigorous plant, sparsely hairy, the runners extending several ft. in a season and rooting at the joints; fl.-sts. ascending, much branching, 1–2 ft.: roots of thick fibers but not tuberous: radical and lower lvs. very long-petioled, nearly orbicular in outline, ternately compound, the lower lfts. making a cordate or subcordate base to the lf., margins coarsely crenate-dentate: fls. bright yellow, full double, about  $\frac{3}{4}$  in. across, peduncled, freely produced in spring.—Frequent in yards and sometimes escaped; grown as “double buttercup,” *R. repens flore-pleno*, *R. speciosus*, and sometimes as *R. acris flore-pleno*; origin apparently obscure and perhaps not a form of true *R. repens*.

2. *R. asiaticus*, L. TURBAN and PERSIAN BUTTERCUPS. Erect from irregular tubers (which are classed with bulbs in the market), 6–18 in., simple or only sparingly branched, hairy: lvs. ternately compound, lfts. with narrow divisions that are dentate at apex and more or less obtuse: fls. few (1–4 to a st.) on long peduncles, mostly very double in cult. kinds and 1–1½ in. across, bright yellow; petals obovate, rounded. S. E. Eu. and S. W. Asia; variable in cult.

3. *R. aconitifolius*, L. Taller plant, branching above; sts. nearly or quite glabrous, from tuberous roots: lvs. deeply 3-parted, the divisions ovate to lance-ovate and again lobed or notched into broad segms., the divisions on the upper lvs. very acuminate: fls. several to many, 1 in. across, more or less double in the garden kinds, normally white but with yellow double races; sepals and fl.-buds glabrous or only sparsely hairy: achenes veined. Eu.

4. *R. acris*, L. A common and wide-spread variable weed of grass lands, but sometimes cult. in a double-fl. yellow race: root of copious long fibers: erect but diffuse, much-branched, many-fl., hairy, 2–3 ft.: lvs. ternately divided nearly to base, the divisions not stalked and again 3-cleft into mostly lanceolate or almost linear toothed segms.: double fls. about  $\frac{1}{2}$ – $\frac{3}{4}$  in. across; sepals and fl.-buds hairy: achenes not manifestly nerved. Eu.

2. **ADONIS**, L. ADONIS. Three small bright-fl. plants are commonly grown for ornament and others less frequently; the genus has about a score of species in Eu. and Asia.—Annual and perennial, erect: lvs. alternate, dissected: fls. yellow or of the red series, solitary and terminal; sepals 5–8; petals 5–16, flat, deciduous, without nectaries; stamens many: fr. an achene, several or many of them aggregated in a globular or elongated head. (Adonis: a name in mythology.)—Nos. 2 and 3 are sometimes called Pheasants-Eye.

Fls. yellow: perennial.....1. *A. vernalis*

Fls. red (crimson or scarlet), sometimes with yellow center: annual.

Sts. little branched: petals much longer than calyx.....2. *A. æstivalis*

Sts. much branched: fls. small, the petals little longer than calyx.....3. *A. annua*

1. *A. vernalis*, L. SPRING ADONIS. Perennial, 4–18 in. high, sts. simple or sparingly branched with ascending branches, very leafy: fls. solitary and terminal, yellow, opening wide, 2–3 in. across, in early spring; petals 10 or more, lightly toothed: achenes hairy, in dense oblong head. Cent. and S. E. Eu.; in cult. is a white-fl. and double-fl. race.

2. *A. æstivalis*, L. SUMMER ADONIS. Annual, 12–18 in., sparingly branched and mostly toward the top: fls. crimson, opening wide, 1–1½ in. across, June and July; petals flat, obtuse, twice as long as sepals: achenes glabrous. Cent. Eu.

3. *A. annua*, L. (*A. autumnalis*, L.). AUTUMN ADONIS. Annual, 8–24 in., much branched: fls. deep red with darker center, not opening wide, about ¾ in. across, summer to early autumn; petals 6–8, concave, not much exceeding calyx: achenes glabrous. Cent. Eu. to W. Asia.

3. **THALICTRUM**, L. MEADOW RUE. Erect and mostly tall perennial herbs chiefly of the north temp. zone, 80–90 species, a very few cult. for ornament.—Lvs. ternately compound and decompound, the angled or notched ultimate segms. graceful and ornamental: fls. bisexual or unisexual, small and separately inconspicuous but borne in profuse panicles or racemes that have a tassel-like appearance and often showy from the colored stamens; some species diœcious; petals lacking; sepals 4 or 5, usually falling early, sometimes neutrally colored and petal-like; stamens many; carpels few, 1-ovuled, maturing into a little cluster of sessile or stalked achenes, which are sometimes inflated or winged. (*Thalic-trum*: old Greek name.)—Several ornamental native species are likely to be planted in borders.

Frs. 2–3-winged, strongly angled, often stipitate and hanging.

Wings of fr. 3: stamens much exceeding sepals.....1. *T. aquilegifolium*

Wings 2: stamens little if any exceeding sepals.....2. *T. dipterocarpum*

Frs. not winged, but more or less ridged, mostly sessile.

Fls. in open panicles; stamens hanging.....3. *T. minus*

Fls. umbel-like in the panicle; stamens erect.....4. *T. glaucum*

1. *T. aquilegifolium*, L. Graceful plant with hollow sts., 2–3 ft., glabrous, mostly glaucous, imperfectly diœcious: segms. of decompound lvs. suborbicular to short-oblong, entire on lower sides and base (the base subcordate, truncate or oblique), bluntly few-notched at the broad apex: infl. of many slender-rayed little umbels; staminate fls. with many lilac-purple or pink erect stamens with very long filaments, highly ornamental; pistillate fls. less showy, with few or several stipitate carpels, that in fr. become large hanging 3-winged somewhat inflated achenes. May and June. Eu., Asia; apparently the commonest hort. thalictrum in this country; there is a var. with white stamens.

2. *T. dipterocarpum*, Franch. Panicle narrowly pyramidal; fls. rather large, rose-colored: achenes short-stipitate, obovate, unequal-sided, 3-nerved on each side, 2-winged. W. China.

3. *T. minus*, L. St. usually not hollow, 1–1½ ft. high, striate, leafless but sheathed at the base: lvs. 2–3-pinnate; segms. 3-cleft and glaucous, numerous and small, roundish or broadly wedge-shaped, stipules with spreading auricles: fls. mostly drooping in panicles, with ascending branches, greenish-yellow, bisexual, the anthers apiculate: achene fusiform, 8-ribbed. Eu.—Probably some of the plants in cult. under this name are really *T. majus*, Smith, 3–4 ft., st. leafy to base and panicle with spreading or even reclinate branches, stipules with reflexed auricles. Eu. *T. adiantifolium*, Hort., is one or the other, or both, of these plants.

4. *T. glaucum*, Desf. (*T. speciosum*, Hort.). Stout erect plant, 2–4 ft., glaucous: segms. ovate-orbicular, 3-lobed and the lobes toothed: fls. erect in umbel-like clusters in panicles, bisexual; sepals and stamens yellow: fr. sessile, striate, ovate. S. Eu.

4. **ANEMONE**, L. ANEMONY. WINDFLOWER. Spring-, summer- and autumn-flowering perennials, some of them very early; species 80–90 if the genus is defined broadly, mostly of the north temp. zone, some of them in high mts.; a few are grown for the handsome fls.—Plants very short or 2–3 ft. or more high: lvs. mostly radical, lobed, divided or dissected, sometimes compound; st.-lvs. 2 or 3 together forming a kind of involucre to the fl. although sometimes remote from it: fls. mostly showy although lacking petals, the



colored parts being few or many petaloid sepals; stamens many, shorter than the sepals; carpels many, ripening into 1-seeded often tailed or appendaged achenes. (Anemo-ne: ancient Greek name.)—Some of the native species may be encountered in cult. grounds, and perhaps others of the European kinds in choice collections. *A. palmata*, L., of the Medit. region, is an old garden plant that may be found in this country: a low plant with long-petioled cordate or reniform shallowly lobed basal lvs., and a narrow-divided sessile involucre far below the yellow fl. *A. nemorosa*, L., the little vernal windflower of Eu., which may be cult. here, is 3–8 in. high with 5-parted basal lvs. appearing after the fl.-st., an involucre of 3 petioled 3–5-parted lvs., and a solitary white or purplish fl. about 1 in. across. *A. canadensis*, L. (*A. pennsylvanica*, L. *A. dichotoma*, Michx.), is a hairy native plant spreading rapidly, with long-petioled 5–7-parted basal lvs., with long peduncles appearing above the main involucre, and white fls. 1–2 in. across; plant 1–2 ft. tall.

Achenes with a silky tail (developed from the style), 1 in. or more long. . . 1. *A. Pulsatilla*  
Achenes with short beak.

Plants low, simple or little branched, the peduncle usually 1: spring, summer.

Lvs. of involucre sessile.

Involucral lvs. divided into narrow or linear parts: fls. red, blue, white. . . 2. *A. coronaria*

Involucral lvs. little or not at all lacinate.

Fls. red, purple, or whitish; stamens brown-violet. . . 3. *A. hortensis*

Fls. bright scarlet or vermilion; stamens black. . . 4. *A. fulgens*

Lvs. of involucre prominently stalked. . . 5. *A. sylvestris*

Plants tall and much branched: peduncles many: autumn. . . 6. *A. japonica*

1. *A. Pulsatilla*, L. (*Pulsatilla vulgaris*, Mill.). PASQUE-FLOWER. Low plant with a woody stock or caudex scarcely rising above the ground: lvs. basal, hairy, pinnatisect into fine divisions: scape 2–8 in. tall (lengthening in fr.), silky-hairy, with a sessile involucre of linear segms. close to the single large bell-shaped violet-purple fl.  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across; sepals 6, silky outside: achenes with long silky tails. Eu.; apparently little known here.—American Pasque-Flower, *A. patens*, L., var. *Wolfgangiana*, Koch, has ternatisect lvs.; prairies Wis. and Ill. west, sometimes planted.

2. *A. coronaria*, L. POPPY ANEMONY. Root irregularly tuberous: main st. a very short crown or caudex at surface of ground, from which rises the nearly glabrous peduncle or scape 6–18 in. high: basal lvs. ternately compound or twice compound, with narrow-cuneate segms.; involucral lvs. close to the fl. or 1–3 in. removed, cut into many narrow divisions, spreading: fls. solitary and terminal,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, poppy-like, in many shades in red and blue, also white; stamens blue. Medit. region; the leading florists' anemone for pots; there are many named races, as The Bride, St. Brigid, Chrysanthemiflora; some of them are double-fl'd.—Nos. 2, 3, 4 are tuberous-rooted anemones sold with bulbs for florists' and gardeners' use, with large very showy fls.; usually bloomed in spring.

3. *A. hortensis*, L. BROAD-LEAVED ANEMONY. Lvs. 1-ternate, sometimes only ternately-lobed, the parts broad, teeth sharp-pointed; involucre mostly remote from the fl., the lvs. erect or even appressed and little or not at all divided: fls. red, rose, purple, or whitish, single; stamens brownish-violet. S. Eu.

4. *A. fulgens*, Gay. SCARLET ANEMONY. Basal lvs. ternately-lobed or sometimes compound, some or all of them with rounded divisions, the later lvs. usually more deeply cut; involucre more or less remote, the small lvs. erect or appressed, either entire or somewhat cut-toothed: fls. vivid scarlet or vermilion, with contrasting black stamens. France.

5. *A. sylvestris*, L. SNOWDROP ANEMONY. Rootstock creeping: peduncle or scape 8–18 in., hairy, simple or sometimes forked at involucre: basal lvs. ternately cleft or divided, more or less hairy beneath and on the petioles; involucral lvs. long-petioled, very remote from fl., ternately parted: fls. solitary or 2, pure white,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, inclined or nodding, fragrant; sepals 5 or 6, blunt, emarginate and perhaps erose: spring. Eu., S. W. Asia.

6. *A. japonica*, Sieb. & Zucc. JAPANESE ANEMONY. Stout branching plant, 2–3 ft., soft hairy: basal lvs. large, very long-stalked, ternately compound, each of the ovate more or less shallow-lobed and dentate lfts. stalked; st. mostly naked but with successive 2-leaved involucre: fls. large, open and showy, 2–3 in. across, terminal on the successive erect branches, white, rose, reddish, purplish, in autumn. Japan, China; a popular hardy plant; there is a var. with crisped lvs.

5. **CLEMATIS**, L. **CLEMATIS**. VIRGINS BOWER. Defined broadly, the genus has 150-200 species in many regions, mostly temp.; many have been introduced to cult., and are known in botanic gardens and choice collections, but relatively few are common.—Woody vines climbing by clasping petioles and sometimes erect perennial herbs: lvs. opposite, entire or pinnately compound: fls. small or large, solitary or variously paniculate, sometimes showy individually and in other species only in the mass; sepals mostly 4 or 5, valvate in the bud; petals none, or in one section represented by staminoid bodies; stamens many; pistils many, forming 1-seeded mostly tailed achenes in a head. (Clem-atis: an old Greek name for a climbing plant.)—The large-fl. kinds of gardens are mostly hybrids and other cultivars.

- A. Plant herbaceous or essentially so (dying to ground in winter), erect or at least not climbing.
- B. Lvs. simple. .... 1. *C. integrifolia* (and others)
- BB. Lvs. ternate. .... 2. *C. heracleæfolia*
- BBB. Lvs. pinnate. .... 3. *C. recta*
- AA. Plant manifestly woody, climbing.
- B. Sepals erect in the fl., conniving to form a tubular or urn-shaped body; stamens also upright and appressed.
- C. Achenes with plumose styles.
- D. Fls. bright scarlet; sepals glabrous outside. .... 4. *C. texensis*
- DD. Fls. dull purple; sepals pubescent outside. .... 5. *C. Viorna*
- CC. Achenes without plumose styles. .... 6. *C. crispa*
- BB. Sepals spreading, the fl. usually wide open; stamens also spreading or at least divergent.
- C. Fls. large (1½ in. across and upward, usually much more), blue, violet, red, as well as white, solitary or in 3's or sometimes in axillary panicles.
- D. Lfts. or lvs. entire or essentially so.
- E. Fruiting style long and plumose.
- F. Pedicels shorter than sepals; lvs. simple or ternate. .... 7. *C. lanuginosa*
- FF. Pedicels longer than sepals; lvs. ternate or pinnate.
- G. Color of fls. delicate lilac. .... 8. *C. patens*
- GG. Color velvety purple, with ribbed bar down center of each sepal. .... 9. *C. Jackmani*
- GGG. Color rose-purple, with 2 or more darker longitudinal veins and dark side veins. .... 10. *C. Lawsoniana*
- GGGG. Color creamy-white. .... 10. var. *Henryi*
- EE. Fruiting style short and not plumose.
- F. Diam. of fl. 2-4 in.; fls. somewhat campanulate; sepals usually 5 or 6. .... 11. *C. florida*
- FF. Diam. 1-2 in.; fls. open wide; sepals 4. .... 12. *C. Viticella*
- DD. Lfts. serrate or dentate.
- E. Sepals prominently silky-pubescent outside, white. .... 13. *C. lasiantha*
- EE. Sepals glabrous outside, or nearly so.
- F. Color yellow. .... 14. *C. orientalis*
- FF. Color white to pink. .... 15. *C. montana*
- CC. Fls. small (seldom above 1 in. across), white or pinkish, usually many in terminal or axillary panicles or cymes (rarely 3; if in some cases solitary, then the pedicel bracted about the middle).
- D. Lvs. ternate. .... 16. *C. virginiana*
- DD. Lvs. pinnate.
- E. Margins of lfts. strongly toothed. .... 16. *C. ligusticifolia*
- EE. Margins mostly entire.
- F. Fl.-clusters axillary, shorter than lvs. .... 17. *C. Vitalba*
- FF. Fl.-clusters terminal panicles, or if axillary then lf.-bearing. .... 18. *C. paniculata*
- DDD. Lvs. bipinnate. .... 19. *C. Flammula*

1. *C. integrifolia*, L. Herbaceous or essentially so, erect, 1½-2 ft., slender and diffuse, at top nearly or quite glabrous: lvs. simple and entire, sessile, ovate to ovate-lanceolate, with 1 or 2 strong veins either side the midrib: fls. solitary on the ends of branches, nodding, urn-shaped, dull blue; sepals 4, tomentose inside, 1-2 in. long: fruiting styles plumose. Eu., Asia.—*C. Fremonti*, Wats., native Mo. to Colo., may be confused with this: differs in thick coriaceous very veiny large lvs. 3-4 in. long, stiff habit, sepals not long-pointed and much exceeding stamens, styles of achene silky at base but has naked above. *C. ochroleuca*, Ait., native in the eastern states, is similar but has yellow fls. and very plumose fruiting styles.

2. *C. heracleæfolia*, DC. Herbaceous or somewhat woody at base, stout and erect, st. many-striate and glabrous: lvs. ternate, the 3 lfts. stalked, large, broad-

ovate, rounded at base, 4-6 in. long, with large mucronate-pointed teeth: fls. tubular, many in axillary and terminal clusters, light blue,  $\frac{3}{4}$ -1 in. long; sepals 4, reflexing; fruiting stigmas club-shaped and recurved. China.—Var. *Davidiana*, Hemsl. (*C. Davidiana*, Decne.), apparently the more usual form in cult., has lfts. cuneate at base, fls. bright blue, fragrant, 6-15 together in heads and also few or single in the axils. China.

3. *C. recta*, L. (*C. erecta*, L.). Herbaceous and erect or ascending, or perhaps slightly woody at base, 2-3 ft., glabrous: lvs. pinnate; lfts. 5-9, petiolulate, narrowly ovate-pointed, entire: fls. many in a large terminal compound panicle-like infl., white, fragrant,  $\frac{3}{4}$ -1 in. across; summer: there is a double-fl. var. S. Eu.—Var. *mandshurica*, Maxim. (*C. mandschurica*, Rupr.), is taller, more slender, lfts. obtuse, pure white fls. in both terminal and axillary panicles. E. Asia.

4. *C. texensis*, Buckl. (*C. coccinea*, Engelm. *Viorna coccinea*, Small). SCARLET CLEMATIS. Neat attractive climber to 6 ft. and more, glabrous: lvs. pinnate, somewhat glaucous; lfts. broad-ovate,  $\frac{3}{4}$ -1½ in. and more long, rather thick, mostly subcordate at base, obtuse or very short-pointed at apex and usually apiculate: fls. solitary on long peduncle with a pair of broad simple bracts near base, nodding, urn-shaped or pitcher-shaped,  $\frac{3}{4}$ -1 in. long, glabrous outside, scarlet, in summer: fruiting style 1-2 in. long, plumose. Tex.; hardy N.—Several hybrids have been produced between this species and *C. crispa* and others.

5. *C. Viorna*, L. VIORNA. Climbing, 10 ft. and more: lvs. thin, not glaucous; lfts. ovate-lanceolate and long-pointed, 2-4 in. long, subcordate: fls. solitary, the long peduncle usually with a pair of narrow bracts, nodding, purplish; sepals very thick, finely or thinly pubescent outside: fruiting style 1 in. long, plumose. (*Viorna*: name adopted by Linnæus without explanation.) Pa. south and west; perhaps not often planted, but it must be distinguished from No. 4 which is frequently grown.

6. *C. crispa*, L. (*Viorna crispa*, Small). Low and slender climber, with very thin pinnate lvs.; lfts. 3-5 or more, often divided into 3's, the parts mostly ovate in outline: fls. solitary, nodding, 1 in. long more or less, urn-shaped with open flaring top with recurved crisped sepals, purple to whitish: fruiting styles hairy, not plumose. Pa. south and west.—*C. cylindrica*, Sims, is a hybrid with *C. integrifolia*.

7. *C. lanuginosa*, Lindl. Rather low or short climber: lvs. simple or with 3 lfts., each cordate-acuminate, woolly beneath: fls. in summer, erect on stout pedicels that are shorter than the sepals, woolly in the bud, 6 in. across when expanded, lavender or blue-gray; sepals 5 or 6, ovate, thick; stamens pale reddish-brown: fruiting styles plumose. E. China.—The largest fl. of the wild species and the chief parent of the large-fl. garden clematises.

8. *C. patens*, Morr. & Decne. (*C. cærulea*, Lindl.). Taller and more slender than No. 7, with smaller and narrower lfts., the lvs. being ternate or pinnate: fls. in spring, on pedicels longer than the sepals, borne on old (last year's) wood, delicate lilac; sepals about 8, narrow, spreading; stamens purple. Japan.—One parent of many garden kinds.

9. *C. Jackmani*, Moore. Hybrid, or name applied to a series of hybrids, constituting a well-known large-fl. cultural race, issuing from *C. lanuginosa* and forms of *C. Viticella*, with the lvs. and general habit of the former: fls. large and flat, 5-6 in. across, usually in 3's and forming terminal panicles, velvety purple with 3 ribs on the back and 3 corresponding furrows down the front center of each of the 4-6 very broad sepals; stamens pale green. Produced at the nursery of G. Jackman & Son, Woking, England; first bloom appeared in 1862.

10. *C. Lawsoniana*, Anderson-Henry. Hybrid between *C. lanuginosa* and *C. florida* var. *Fortunei*, with fls. 6 in. across and flat, rose-purple with 2 or more darker parallel veins or ribs and also darker side veins, the very broad sepals 6-8. Raised by Anderson-Henry and introduced in England about 1872 by P. Lawson & Son, nurserymen.—Var. *Henryi*, Rehd. (*C. Henryi*, Anderson-Henry, not Oliv.), has large flat creamy-white fls.; strong plant, much like *C. lanuginosa*.

11. *C. florida*, Thunb. Slender but tall climbing: lvs. various, mostly ternate or biternate; lfts. small, ovate-lanceolate, acuminate or pointed: fls. flat, 2-4 in. across, creamy-white and barred purple beneath; sepals 5-6, broad-ovate, sharp-pointed; stamens purplish. Japan.—Var. *Fortunei*, Moore (*C. Fortunei*, Hort.), has double creamy-white fls. becoming pink; associated with the name of Robt. Fortune, traveler in the Far East, page 447.

12. *C. Viticella*, L. Strong climber; sts. glabrous: lvs. entire, or more commonly of 3 nearly or quite entire lfts.: fls. solitary or in 3's, blue, purple or rose-purple, 1½-2 in. diam.; sepals 4, obovate, pointed, reflexed; stamens yellow: fruiting styles short and glabrous. (*Viticella*: diminutive of *Vitis*, the vine.) S. Eu., S. W.

Asia.—Many hybrids issue from this species, known mostly by the sepals being reflexed or recurved at tip. *C. eriostemon*, Decne. (*C. Hendersonii*, Hort.), blue, is *C. Viticella* × *C. integrifolia*.

13. *C. lasiantha*, Nutt. PIPESTEM CLEMATIS. Tomentulose climber: lvs. ternate, silky-pubescent at least beneath; lfts. elliptic, broad-ovate to orbicular, 1-2 in. long, coarsely toothed and more or less lobed; fls. 1-3 on axillary peduncles from last year's wood, polygamous,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. across, white, fragrant, the sepals broad-oblong to oval and silky-pubescent outside: fr. pubescent with feathery tails 1 in. or more long. Calif., and planted in that region.

14. *C. orientalis*, Lam. (*C. graveolens*, Lindl.). Rapidly growing nearly or quite glabrous climber: lvs. pinnate, with 3 or 4 pairs of lfts., thin, glaucous and more or less glossy; lfts. ovate to long-oblong, 1-3 in. long, stalked, 3-parted or -lobed, the divisions strongly dentate to entire: fls. solitary, or few in cymes, nearly or quite erect, yellow-veined and tinted greenish, scented,  $1\frac{1}{2}$  in. or somewhat more across, the 4 spreading or recurved sepals more or less lightly pubescent both sides; styles plumose in fr. Persia, Himalayas; cult. in Calif. and probably in the S.

15. *C. montana*, Buch.-Ham. Tall climber to 15 and 20 ft.: lvs. ternate; lfts. oblong-acuminate, cut-toothed: fls. several in the axils appearing successively, anemomy-like, about 2 in. across, open, fragrant, white, becoming pink; stamens yellow and conspicuous: fruiting style long and plumose, the achene glabrous. Himalayas.—There are large-fl. vars. also with pink fls.

16. *C. virginiana*, L. Strong mostly dioecious climber, covering bushes and fences in its native places and also planted: lvs. ternate; lfts. ovate to narrow-ovate, acuminate, sharp-toothed, subcordate or rounded at base, 2-5 in. long, stalked, villous beneath when young: fls. many in leafy cymose panicles, white, about  $\frac{3}{4}$ -1 in. across, summer to autumn; sepals oblong to narrow-ovate, spreading: frs. in prominent heads with long profuse plumose styles. N. S. to Ga.—Westward this species is represented by *C. ligusticifolia*, Nutt., also sometimes planted: lvs. pinnately 5-7-foliolate, the lfts. pointed and sharply notched, silky pubescent beneath: fls. white, many; sepals tomentose.

17. *C. Vitalba*, L. TRAVELERS JOY. OLD MANS BEARD of England. Very vigorous climber; sts. striate, glabrous: lvs. odd-pinnate, of 2-3 pairs; lfts. ovate to narrow-ovate, acuminate, cordate to rounded at base, stalked, 2-3 in. long, entire or notched: fls. many in axillary panicles, greenish-white and fragrant,  $\frac{3}{4}$ -1 in. across, summer to autumn: fruiting styles long and plumose, the heads dense. (*Vitalba*: *Vitis alba*, white vine.) Eu., N. Afr., S. W. Asia.

18. *C. paniculata*, Thunb. Vigorous nearly glabrous climber, and now commonly planted for its hardness, good profuse foliage and profusion of fragrant white fls. in autumn: lvs. odd-pinnate, the pairs 1 or 2; lfts. mostly small, 1- $2\frac{1}{2}$  in. long but sometimes longer, short-ovate to ovate to broad-ovate, obtuse or short-acute, apiculate, tapering, rounded or even subcordate at base, sometimes lobed but margins entire, terminal one very long-stalked: fls. paniculate, 1- sometimes  $1\frac{1}{2}$  in. across; sepals 4: fruiting style rather long, plumose. Japan.

19. *C. Flammula*, L. Slender but vigorous; sts. glabrous: lvs. mostly 2-pinnate, dark green, stiffish and semi-persistent, the pairs 2-5; lfts., at least those at middle and base of lf., ternate, the segms.  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, stalked, ovate to nearly oval, short-acute or obtuse, apiculate: fls. many in axillary and terminal panicles, small,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, pure white, fragrant; sepals 4, linear-oblong: fruiting styles long and plumose. (*Flammula*: Latin a little flame, an ante-Linnæan application to this plant.)

6. ERANTHIS, Salisb. About half-dozen species of little European and Asian herbs with tuberous perennial rootstocks, one listed among florists' bulbs.—Lvs. mostly basal, palmately dissected; cauline lf. 1, just beneath the fl. and forming an involucre: fl. solitary, yellow, the showy part being the 5-8 sepals; petals represented by scale-like nectaries; stamens many; carpels few to many, stipitate, many-ovuled, maturing into a cluster of dehiscent follicles. (Eranthis: Greek flower of spring.)

*E. hyemalis*, Salisb. Glabrous: st. or scape erect and simple, 2-8 in.: basal lvs. orbicular, long-petioled, cut nearly to the base into cuneate lobes which are again lobed into linear or oblong segms.; involucre lf. similar: fl. 1- $1\frac{1}{2}$  in. across, wide-opening, equaled or exceeded by the calyx-like involucre: follicles about  $\frac{1}{2}$  in. long, shaped like a bean-pod. Eu.; somewhat naturalized; blooms early spring, or earlier in mild winters and climates.



7. **NIGELLA**, L. FENNEL-FLOWER. Erect annual herbs of the Medit. region and W. Asia, about a dozen species, a few of which are cult., mostly in the flower-garden.—Lvs. alternate, pinnately multifid into linear or filiform parts: fls. white, blue, or yellow, often showy, sometimes closely subtended by a leafy involucre; sepals 5 and petal-like, showy; petals 5, clawed, bifid, the blade small; pistils 5, sometimes less or more, united at base to form a compound ovary which is exceptional in the family: caps. dehiscent at top, many-seeded. (*Nigel*-la: Latin *little black*, alluding to the seeds.)

Fls. closely subtended and surrounded by a multifid involucre.....1. *N. damascena*  
Fls. not so subtended.

Anthers apiculate: caps. beaked aside from the persistent styles.....2. *N. hispanica*  
Anthers obtuse: caps. not beaked.....3. *N. sativa*

1. **N. damascena**, L. LOVE-IN-A-MIST. Glabrous, erect, 12-20 in., much branching: fls. solitary at ends of branches, white or light blue, 1-1½ in. across, surrounded by a profuse very finely cut involucre (whence the English name); anthers apiculate: fr. united to the top making a globular-oblong somewhat inflated caps., with long erect styles. S. Eu.; a common flower-garden annual, and sometimes escaped; there are dwarf and double-fl. kinds.

2. **N. hispanica**, L. Glabrous, erect or diffuse, 12-20 in., branching: fls. solitary or 2 together, deep blue with red stamens, 1¼-2½ in. across, without involucre or sometimes an uppermost spreading lf. near the fl. but not enveloping it: carpels not joined at summit, the beaks and styles wide-spreading, the caps. narrow and ribbed. Spain and N. Afr.; flower-garden annual, less frequent than No. 1.

3. **N. sativa**, L. Somewhat hairy, erect and erect-branching: fls. solitary, pale blue, small, ¾-1½ in. across, on a long naked peduncle-like st.; anthers obtuse: carpels joined nearly or quite to top, rounded at apex and without projecting beaks but styles spreading. Medit. region; sometimes cult. for the aromatic 3-angled wrinkled black or brown seeds used for seasoning.

8. **TROLLIUS**, L. Low perennial herbs, sometimes grown for the showy fls., of about a dozen species in the north temp. zone, in moist and marshy places.—Erect or ascending from thickened fibrous roots: lvs. basal and cauline, palmately lobed or divided and usually sharp-toothed: fls. terminal and mostly solitary, large, yellow, nearly white or purplish; sepals 5-15, petaloid, providing the showy part; petals 5 to many, small and staminoid, with a nectar pit at base; stamens many; carpels 5 to many, sessile, many-ovuled, forming a cluster of dehiscent follicles. (*Trol*-lius: Germanic *trol*, round, from the shape of fls. of some species.)—The names are likely to be confused in cult.

Petals about equaling the stamens, or shorter.

Fl. globular, the sepals incurving.....1. *T. europæus*  
Fl. open, the sepals spreading.....2. *T. caucasicus*

Petals manifestly longer than stamens; sepals spreading.

Sepals 5.....3. *T. Ledebouri*  
Sepals 10-15.

Petals not prominent or protruding.....4. *T. asiaticus*  
Petals long and conspicuous.....5. *T. chinensis*

1. **T. europæus**, L. GLOBE-FLOWER. Simple or considerably branched, 1-2 ft., several sts. from the root: radical lvs. petiolate, the cauline sessile, 5-parted or -divided into broad or cuneate parts, variously toothed: fls. lemon-yellow, May-July, sometimes in 2's, globular, 1-2 in. across; sepals 10-15, very broad, obtuse; petals narrow-spatulate, about equaling stamens but sometimes a little longer or a little shorter. Mts. and uplands of Eu.

2. **T. caucasicus**, Stev. Radical lvs. dissected, the segms. cut-toothed: fl. open, yellow; sepals 5-8, elliptic; petals about 10, of length similar to the stamens. S. W. Asia.

3. **T. Ledebouri**, Reichb. f. Stout, 2 ft.: lvs. divided to base, the divisions lobed and toothed: fls. yellow; sepals 5, spreading, ovate; petals 10-12, narrow-linear, exceeding the stamens. (*Ledebouri*, from name of a Russian botanist in the early part of the 18th century.)

4. **T. asiaticus**, L. (*T. giganteus*, Hort.). Rather tall: radical lvs. bronze-green, finely cleft and lobed: fls. orange, in spring; sepals 10, spreading; petals 10, longer than stamens. Siberia.

5. *T. chinensis*, Bunge (*T. sinensis*, Hort.). St. often branching above: radical lvs. deficient or obsolete; lower st.-lvs. reniform and upper ones orbicular-reniform, very large (sometimes 5 in. long and 6 to 7 in. across), 5-parted with broadly oblanceolate segms.: sepals 12 or 13, spreading, the inner ones usually narrower and somewhat longer than the outer, all obtuse and sometimes with angled margins; petals 20, linear, more than 1 in. long, exserted and surpassing the stamens; May. N. China.

9. **HELLEBORUS**, L. **HELLEBORE**. Fifteen or more species are recognized by some authors, but others consider them fewer; perennial herbs of Eu. and W. Asia, one commonly grown for ornament.—Erect low plants, with roots of thick fibers; st. with sheaths at base, naked above or bearing a few small sessile lvs. or large bracts: basal lvs. palmately divided or compound, long-petiolate: fls. large, solitary, few or several; sepals 5, petaloid and showy, usually becoming dry and persistent, white, greenish, red, purple, or yellowish; petals small and tubular, inconspicuous, usually shorter than the many stamens; carpels 3–10, sessile, maturing into leathery or papery dehiscent several-seeded follicles. (Helleb-orus: the classical name of one of the species.)—White hellebore is *Veratrum*, of the Liliaceæ.

*H. niger*, L. **CHRISTMAS-ROSE**, so-called because it may bloom in midwinter in mild regions, or even under the snow if the ground is not too cold, but in cold climates very early in spring: st. or stock not rising above the ground; scape-like flowering st. 6–18 in., simple or forked, bearing small lvs. or clasping bracts: basal lvs. often overtopping the fls., deeply divided into 7 or more oblong or narrowly obovate dentate glabrous lfsts., thick and evergreen: fls.  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, white or purplish; petals green, shorter than stamens. Eu.; several vars. are known; somewhat naturalized.—*H. orientalis*, Lam., perhaps cult., has fl.-sts. two or three times forked and without lvs. below fl.: lfsts. pubescent. Asia Minor.

10. **ZANTHORHIZA**, L'Her. (*Xanthorrhiza*, Marsh). One species, a little shrub in E. N. Amer.—Lvs. pinnate or 2-pinnate: fls. small, in slender drooping simple or branched racemes; sepals 5, petaloid and deciduous; petals usually 5, smaller than sepals, 2-lobed; stamens 5–10; carpels 5 or more, sessile, 2-ovuled but maturing into 1-seeded dehiscent follicles, the short style becoming dorsal. (*Zanthorhi-za*: from Greek words, *yellow root*.)

*Z. apifolia*, L'Her. **SHRUB YELLOW-ROOT** from the color of root (wood of st. also yellow): suckering: sts. 1–2 ft. high: lfsts. about 5, sharply lobed and toothed, often again divided: racemes at base of lf.-crown, with brown-purple star-shaped fls.  $\frac{1}{4}$  in. or less across.

11. **CIMICIFUGA**, L. **BUGBANE**. A dozen or more tall upright perennial herbs, sometimes planted for ornament, native in north temp. zone.—Lvs. large, ternately decompound: fls. small, white, many in long racemes; sepals 2–5, petaloid, soon deciduous; petals 1–8 or none, small, clawed, 2-lobed; stamens many; carpels 1–8, sessile or stipitate, many-ovuled, maturing into dehiscent follicles. (*Cimicif-uga*: Latin *bugbane*.)—There are a half-dozen native species, one or two of which may be found sometimes in planted borders: *C. racemosa*, Nutt., Black Snakeroot, with 1 or 2 sessile carpels and broad stigmas, a rather stately plant 3–8 ft. tall with very long erect spikes of white fls. with conspicuous stamens; *C. americana*, Michx., similar but not so tall and with 3–8 stipitate carpels and minute stigmas. The genus is closely allied to *Actæa*, with which some authors unite it, but that genus has very short racemes and yields berries.

Fls. white; pedicels with very small bract at base or none.....1. *C. simplex*  
Fls. creamy-white; pedicel manifestly bracted.....2. *C. davorica*

1. *C. simplex*, Wormsk. (*C. racemosa* var. *simplex*, Regel). Plant 2–3 ft.: fls. white, short-pedicelled, in a slender dense raceme, bracts minute or lacking: lfsts. truncate or tapering at base. Kamtschatka.

2. *C. davorica*, Maxim. Plant 3–4 ft., with large cordate or subcordate lfsts.: fls. creamy-white, pedicelled with evident bracts. Asia.

**12. AQUILEGIA, L. COLUMBINE.** Attractive herbaceous perennials of the north temp. zone, variable, 30-50 species, many of them in cult., together with hybrid races that cannot be referred directly to an original species.—Mostly prominently branching, erect: lvs. 2-3-ternately compound: fls. terminating the branches, showy, hanging or erect, in spring and early summer, characterized by the long hollow nectariferous backward-projecting spurs of the 5 petals which have a short broad lip projected to the front; sepals 5, regular, colored like the petals, mostly much shorter than the petal-spurs; stamens numerous, some of the inner ones represented by staminodia; carpels 5, sessile, many-ovuled, maturing into dehiscent separate erect follicles. (*Aquile-gia*: origin of the word open to doubt.)—The doubling of *aquilegia* fls. under cult. may be the multiplication of spurs or of plane sepals. The petals are perhaps specialized staminodia rather than true perianth; these organs bear two quite different parts, the expanded blade or lamina and the spur, and the characters of these parts afford some of the best marks for identification. The "long-spurred hybrids," now popular in gardens, are derivatives probably of *A. cærulea*, *A. chrysantha*, and others.

Spurs strongly incurved or hooked at end.

Limb of petal longer than spur..... 1. *A. flabellata*

Limb not exceeding spur, usually much shorter.

Sepals twice or more longer than petal-limb.

St. glandular at least above; follicles pubescent..... 2. *A. glandulosa*

St. not glandular; follicles glabrous..... 3. *A. sibirica*

Sepals about half or less longer than petal-limb: st. not glandular:

follicles pubescent..... 4. *A. vulgaris*

Spurs not hooked or incurved at end, although sometimes knobbed.

Fls. nodding; spurs red.

Sepals usually equaling or exceeding the spurs, horizontally spreading or reflexed..... 5. *A. formosa*

Sepals shorter than spurs, slightly spreading or erect.

Basal lvs. biternate..... 6. *A. canadensis*

Basal lvs. triternate..... 7. *A. Skinneri*

Fls. erect; spurs not red.

Sepals deep blue (a white var.)..... 8. *A. cærulea*

Sepals (and fls.) yellow..... 9. *A. chrysantha*

1. *A. flabellata*, Sieb. & Zucc. Plant 1-1½ ft., with few fls.: lfts. nearly sessile: fls. nodding, about 2 in. across, bright lilac or pale purple, sometimes white, summer; sepals about 1 in. long, obtuse, twice as long as the often white limb of the petals; spurs shorter than petal-limb, slender toward the end and much incurved; stamens not protruded: follicles glabrous. Japan.—There is a dwarf white-fl'd. form.

2. *A. glandulosa*, Fisch. Plant 1-1½ ft., pubescent and glandular, at least above, with few large fls.: lvs. biternate; lf.-segms. narrow; st.-lvs. few and mostly bract-like: fls. nodding, 2-3 in. across, lilac-blue, spring and early summer; sepals ovate-acute, about 1½ in. long and half as broad; limb of petal lilac-blue (as are the sepals) but usually tipped and bordered creamy-white, very broad, less than half as long as sepals; spurs very short, ½ in. or less, stout and much incurved; stamens not protruded: follicles densely hairy, about 1 in. long and bearing short falcate styles. Siberia.

3. *A. sibirica*, Lam. Plant 1-2 ft., bearing many fls.: sts. pubescent or sometimes nearly smooth: lvs. biternate; terminal lfts. large, 1 in. or more broad, with rather shallow and rounded lobes; lower st.-lvs. biternate and petiolate: fls. somewhat nodding or horizontal or in some forms erect, 2-3 in. across, lilac-blue, summer; sepals oblong, 1 in. or more long, spreading or a little reflexed; limb of petals half as long as sepals, often white; spurs rather stout, ½-¾ in. long, much incurved or even coiled; stamens not protruded: follicles glabrous, 1 in. long. E. Siberia.—There is a double-fl'd. var.

4. *A. vulgaris*, L. Plant stout, finely pubescent or the st. sparsely short-hairy, 1-2½ ft., many-fl'd.: lower st. and basal lvs. biternate, ultimate lfts. or segms. broad-cuneate, the lobes shallow and more or less rounded: fls. nodding (in double-fl'd. kinds perhaps nearly or quite erect), 2 in. or less across, blue, purple, or white, summer; sepals spreading, ovate, acute, about 1 in. long and half as broad, exceeding limb of petals; spurs about ¾ in. long, about equaling petal-limb, stout, knobbed and much incurved; stamens not protruded: follicles densely pubescent, 1 in. long,

persistent style half as long. Eu. and Siberia, common in cult., often double and of different colors; also somewhat escaped.—Var. *nivea*, Baumg., bears a profusion of large white fls. Var. *olympica*, Baker (*A. olympica*, Boiss. *A. Wittmanniana*, Hort.), has sepals light lilac or purple, 1 in. or more long, and white petal-limb; a hybrid of this var. with *A. glandulosa* is known as *A. Stuartii*.

5. *A. formosa*, Fisch. Plant 15 in. to 3 ft. high, mostly glabrous below but pubescent and viscid at top: basal lvs. biternate, upper ones 3-cleft or simple, more or less pubescent: fls. nodding,  $1\frac{1}{2}$ –2 in. across, red-and-yellow; sepals ovate-lanceolate, acute, widely spreading or reflexed, about 1 in. long, red; limb of petals rounded or truncate, half or less as long as sepals, yellow; spurs stout and straight, a little shorter than sepals, red; stamens long protruded: follicles pubescent, about 1 in. long. Utah and Calif. to Alaska and Siberia.—Var. *truncata*, Baker (*A. truncata*, Fisch. & Mey. *A. californica*, Lindl.), differs in having a very short or almost obsolete petal-limb. Calif. Var. *hybrida*, Hort., a supposed hybrid between forms of *A. formosa* and *A. chrysantha*, has large fls. with scarlet sepals, yellow petal-limbs and long slender spreading spurs.

6. *A. canadensis*, L. Plant 1–2½ ft. high, glabrous or pubescent, very floriferous: basal lvs. biternate, glaucous; lfts. crowded: fls. nodding, 1–1½ in. across, red-and-yellow; sepals lanceolate, usually acute or acuminate, somewhat spreading, ½–¾ in. long, red; limb of petals shorter than sepals, rounded and more or less truncate, yellow; spurs straight, about ¾ in. long, red, the tips often connivent; stamens included: follicles glabrous, nearly 1 in. long, with spreading tips. N. S. south and west; common in the wild, and the source of hybrids with blue-flid. species under cult.

7. *A. Skinneri*, Hook. Plant large, mostly 2–3 ft. tall, glabrous, many-flid.: basal lvs. triternate; lfts. small, with rounded lobes, more or less pubescent beneath: fls. nodding,  $1\frac{1}{2}$ –1¾ in. across, yellowish-and-red; sepals lanceolate-acuminate, ¾–1 in. long, somewhat spreading, greenish-yellow; limb of petals much shorter than sepals, truncate or rounded, yellowish; spurs straight, 1½–2 in. long, pale red; stamens much protruded: follicles pubescent, about 1 in. long. (Dedicated to G. Ure Skinner, collector in Guatemala.) Mts., Mex., Guatemala.—There is a double-flid. var.

8. *A. cœrulea*, James. Plant 1½–3 ft., mostly glabrous below but somewhat viscid-pubescent above: basal lvs. biternate, glabrous, glaucous beneath, those on the st. rather few: fls. commonly erect, large, 2 in. or more across, blue-and-white; sepals ovate-oblong, spreading, 1¼–1½ in. long, deep blue-purple; petal-limbs shorter than sepals, ovate-spatulate, rounded, white; spurs straight or spreading, 1½– about 2 in. long, pale blue; stamens not protruded: follicles pubescent, 1 in. long, with spreading tips. Rocky Mts.; source of many of the cult. blue columbines.—There are double-flid., white-flid. and other races in cult. *A. haylodgensis* represents blue-flid. kinds, probably derived from *A. cœrulea*.

9. *A. chrysantha*, Gray. Plant large, 3–4 ft., much branched, somewhat pubescent: basal lvs. usually triternate; lfts. often densely pubescent beneath: fls. erect, 1½–3 in. across, clear yellow; sepals narrow and acuminate, 1¼–1½ in. long, much exceeding the petal-limbs which are rounded at apex; spurs very slender, 2–2½ in. long: follicles usually pubescent. Rocky Mt. region and Tex.—It runs into dwarf forms and color vars. Var. *Jæschkianii*, Hort., is a dwarf or small plant with large yellow fls. bearing red spurs; perhaps a hybrid.

13. **DELPHINIUM**, L. LARKSPUR. Perennial and annual erect branching herbs, upwards of 250 species in the north temp. zone, some of them showy and popular flower-garden subjects.—Lvs. palmately lobed or divided: fls. in showy racemes or spikes which are often paniculate, prevailing blue but also in other colors, very irregular; sepals 5 and colored, the posterior one prolonged into a spur into which are projected the spurs of the upper pair of petals, the other or lateral pair of petals (if present) small and short-clawed; stamens many; carpels 1–5, sessile, many-ovuled, maturing into dehiscent follicles. (Delphinium: Latin *delphin*, dolphin, from the shape of the fl.)—Several species are native in E. N. Amer., and many others in the W. In common cult. four groups may be clearly recognized: annual rockets; annual branching or forking; perennial rockets or candle kinds; perennial forking or bouquet larkspurs. In the perennial kinds, particularly in the candle group, botanical names have been singularly misapplied. Aside from these groups,



certain of the native species are more or less cult., as the scarlet and red larkspurs; sometimes the native blue or white tuberous-rooted *D. tricornis*, Michx., is transferred to grounds; it has a few-fl. raceme, and 3 divergent follicles as if 3-horned. The perennial garden larkspurs are now mainly cultivars.

Species annual: petals united into 1: carpel 1.

Fls. in long simple racemes: follicles pubescent.....1. *D. Ajacis*

Fls. scarcely racemose, terminating the branches, the clusters (if evident) about as broad as long.

Follicles glabrous: fl. 1 in. or more across in expansion.....2. *D. Consolida*

Follicles pubescent: fl. expanding  $\frac{3}{4}$  in. or less across.....3. *D. divaricatum*

Species annual: petals distinct, not barbate or bearded: carpels 3.....4. *D. cardiopetalum*

Species perennial (but sometimes blooming first year from seed):

petals distinct, lateral ones usually bearded: carpels 3-5.

Fls. (sepals with spurs) yellow.....5. *D. Zalil*

Fls. (sepals with spurs) red.

Lf.-divisions linear, acute.....6. *D. cardinale*

Lf.-divisions broad, obtuse.....7. *D. nudicaule*

Fls. blue, varying to white.

Lvs. cut into linear segms.: infl. diffuse.....8. *D. grandiflorum*

Lvs. with segms.  $\frac{1}{4}$  in. or more broad: infl. manifestly spicate-racemose.....9. *D. cultorum*

1. *D. Ajacis*, L. ROCKET LARKSPUR, so called because of the narrow spike-like erect racemes: the common annual flower-garden larkspur in many staturs and colors: st. usually 1-2 ft. tall, but sometimes 3-4½ ft., mostly puberulent at least above, the branches rather few and strongly ascending: basal and lower st.-lvs. long-petioled, the blade divided to the petiole into 3 sections and these multifid into linear segms., the upper lvs. sessile and similarly multifid giving a crowded or bunched appearance at the nodes: pedicels ascending, 1½ in. or less long, subtended by a subulate bract and with a pair of similar but smaller bracts midway: fls. 1-1½ in. across at expansion, the parts broad and nearly or quite obtuse, blue or violet varying to rose, pink, and white, often double, the upwardly-curving spur about as long as the remainder of the fl.; carpel 1, or sometimes multiple in doubling forms, maturing into a pubescent follicle  $\frac{1}{2}$ -1 in. long abruptly beaked by the style; seeds transversely thin-ridged. (*Ajacis*: name said to have come from marks at the base of the united petals suggesting the letters AIAI.) S. Eu.; somewhat naturalized in this country.

2. *D. Consolida*, L. FORKING LARKSPUR. Small puberulous or nearly glabrous annual 8-18 in. tall, forking and diffuse with simpler and more upright lvs. than No. 1 and without the bunched appearance at the nodes: fls. few or scattered, terminal on the branches, 1 in. or more in expansion, mostly blue or violet, the parts narrow and acute; carpel 1, glabrous, about  $\frac{1}{2}$  in. long. (*Consolida*: ante-Linnæan substantive name, referring to the consolidated petals.) Eu.; in grain-fields, and sometimes adventive in N. Amer.; there are cult. forms.

3. *D. divaricatum*, Ledeb. Diffuse much-branching annual, 1½-2 ft., appressed-puberulent, sparsely leafy: lvs. multifid into short linear segms.: fls. purplish, on the ends of slender peduncles or branches,  $\frac{3}{4}$  in. across at expansion, the parts short-acute, spur straight and nearly horizontal and twice as long as petals; carpel 1, the mature follicle erect or cernuous, pubescent; seeds shaggy, like cones. S. W. Asia; sometimes grown in the flower-garden.

4. *D. cardiopetalum*, DC. (*D. halteratum*, Sibth. & Sm., var. *cardiopetalum*, Huth). Erect pubescent annual, 10-20 in., with ascending branches: lvs. with linear segms.: fls. blue, in short racemes, expanding  $\frac{1}{2}$ -¾ in. across, petals heart-shaped, the upward-projecting spur exceeding the remainder of the fl.; carpels 3, maturing into triple nearly or quite glabrous follicles  $\frac{3}{4}$  in. long tipped with slender style-beak; seeds with transverse ridges. S. France, and cult.

5. *D. Zalil*, Aitch. Simple or little-branched perennial, producing tubers, becoming glabrous or nearly so, 1-2 ft., the bright yellow fls. in loose racemes: lvs. palmatifid, the segms. linear and stiffish: spur straight, equaling the broad-oval obtuse sepals which are glabrous on the outside and less than  $\frac{1}{2}$  in. long; lower petal bifid and lightly hairy; carpels 3, ribbed, glabrous. Persia, etc.—The yellow fls. are used as a dye; zalil is the native name.

6. *D. cardinale*, Hook. CARDINAL LARKSPUR. Stout large leafy species, 3-6 ft., puberulent: lvs. 3-9 in. across, divided into linear acute segms.: fls. bright scarlet,  $\frac{3}{4}$ -1 in. across at expansion, in long open erect racemes; sepals  $\frac{1}{2}$ -¾ in. long, exceeded by the large curved spur; petals mostly yellow, 2-lobed or emarginate; carpels 3 or 5, glabrous. Calif.

7. *D. nudicaule*, Torr. & Gray. RED LARKSPUR. Lower than No. 6, st. few-leaved or nearly naked: lvs. rather thick, 3-5-parted into divisions  $\frac{1}{4}$  in. or more broad and mostly obtuse: fls. few or rather few in a loose raceme, the sepals and spur red; sepals  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, half or somewhat more the length of the spur; petals more or less yellow, notched or cleft; carpels usually 3, glabrous. Calif., Ore.

8. *D. grandiflorum*, L. BOUQUET LARKSPURS. Rather slender usually much-branched and diffused perennial, 1-3  $\frac{1}{2}$  ft. (but which may bloom the first year from seed); st. and foliage finely pubescent: basal and main st.-lvs. petiolate, base of petiole not expanded or clasping, uppermost lvs. nearly or quite sessile; blades palmatifid into many linear segms. mostly  $\frac{1}{8}$  in. and less broad: peduncles spreading or arched away from axis, 2-3 in. long or the upper ones shorter, bearing a solitary blue or violet fl. (white vars.) wide-expanding 1-1  $\frac{1}{2}$  in., the sprays therefore diffuse and not racemose or consolidated; sepals  $\frac{1}{2}$ - about 1 in. long, broad and nearly or quite obtuse, usually somewhat exceeded by the straight or slightly curved spur; upper petals yellowish or color of sepals, the lower ones color of sepals and bearded; carpels 3, the follicles  $\frac{1}{2}$ -1 in. long, pubescent. Siberia, China.—The larkspurs grown as *D. chinense* or var. *chinense* are low races, 1 to about 2 ft., blooming freely first year from seed, with large fls. The true var. *chinense*, Huth (*D. chinense*, Fisch.), is probably not of garden origin but represents the native China extension of the species. The forms of *D. grandiflorum* constitute a common range of garden larkspurs, characterized by the fine feathery foliage, diffuse scattered habit of infl., gentian-blue of the blue kinds, rapid maturity from seeds.

9. *D. cultorum*, Voss. CANDLE LARKSPURS. Popular flower-garden perennials much planted in borders, characterized by tall strict habit, 3-5 ft. and more, long dense terminal spicate racemes or candles and heavy foliage with the lf.-divisions mostly more than  $\frac{1}{4}$  in. broad: fls. single and double, dark or light blue, violet to white, usually with conspicuous beards (often yellow) on the side petals. Cultigen.—A group of hort. plants, in which the original species cannot be clearly defined, probably derived chiefly from *D. cheilanthum*, Fisch., Siberia to China, *D. elatum*, L., of Eu., possibly *D. formosum*, Boiss., of the Caucasus region, and perhaps others. There are several races within the group, differing in stature, fl. characters and in foliage, these races having more or less recognized garden names. To this group belong *D. Barlowii*, Hort., *D. belladonna*, Hort., *D. ballamosum*, Hort., *D. cashmerianum*, Hort. (not Royle), *D. caucasicum*, Hort. (not C. A. Mey.), *D. elatum*, Hort. (not L.), *D. formosum*, Hort. (not Boiss.), *D. hybridum*, Hort. (not L. or Steph.), *D. Maackianum*, Hort. (not Regel). The determination of the botanical origins of these plants, together with the definition of garden races, awaits special monographic study.

14. **ACONITUM**, L. ACONITE. MONKSHOOD. WOLFSBANE. Showy herbaceous summer- and autumn-flowering perennials (sometimes essentially biennial) with hooded fls., in temp. and cooler parts of north temp. zone; the species are many or numerous, according to the opinion of the monographers, as they are variable, probably more than 100; the aconites contain powerful poisons, and drugs are derived from the roots and lvs. of certain species.—Roots tuberous or thickened: sts. erect, trailing, or semi-scandent, mostly somewhat branched: lvs. palmately veined, lobed or cleft: fls. irregular, mostly blue or purple, sometimes white or yellow, racemose or paniculate; sepals 5, petaloid, the upper one large and hood-like or helmet-shaped; petals 2-5, small, the 2 upper ones spur-like and contained under the hood, the others (if present) minute; stamens many; carpels 3-5, sessile, ripening into several- or many-seeded follicles. (Aconi-tum: ancient classical name).—Several species are native in N. Amer.; one of them, *A. uncinatum*, L., Pa. to Wis., is sometimes advertised: st. slender, partially climbing, 2-5 ft.: lvs. deeply 3-5-lobed: fls. blue, pubescent, with erect conical helmet. The garden forms of aconite are confused.

Sepals persistent beneath the young fr.: lf.-segms. linear: fls. yellow.....1. *A. Anthora*  
 Sepals caducous, the growing fr. naked.

Fls. yellow or yellowish-white; helmet a high narrow cone constricted below the summit.....2. *A. lycoclonum*

Fls. blue or purple (sometimes white vars.); helmet rounded, not constricted.

Infl. a strict spike-like terminal raceme.....3. *A. Napellus*

Infl. diffuse, or the raceme short, loose and not strict.

Helmet narrow, without evident visor.....4. *A. variegatum*

Helmet broad, with a distinct short spur-like projecting visor.....5. *A. Fischeri*

1. *A. Anthora*, L. (*A. pyrenaicum*, Pall.). Root of bulb-like elongated tubers: st. erect and strict, 1-2 ft., pubescent at least above: lvs. divided to base into many linear rather stiff segms.: fls. in spicate racemes, pale yellow; helmet high and rounded, tapering below, produced into a short beak or visor: follicles 5, pubescent. (*Anthora*: an ante-Linnæan name.) S. Eu., summer.

2. *A. lycoctonum*, L. (*A. pyrenaicum*, L.). St. slender and mostly simple, pubescent or glabrate, 3-6 ft. high, the root bulb-like: lvs. orbicular-reniform in general outline, parted nearly to base into 3-9 broad lobes which are again lobed and toothed: fls. yellow or whitish-yellow, in terminal erect spike-like racemes, standing up and down or somewhat spreading, the upright helmet narrow-conical but constricted below the rounded summit, the sepals little if at all spreading: follicles 3. (*Lycoctonum*: *wolf-poison*.) Eu., Siberia: summer or autumn.

3. *A. Napellus*, L. St. erect and strict, 3-4 ft., thinly pubescent at least above, nearly or quite simple, leafy: lvs. divided to the base and again divided or lobed into narrow almost linear segms.: fls. blue (a white var.), in erect close spike-like terminal racemes; helmet much broader than high, rounded on top and ending in a beak-like front or visor: follicles 3 or 4. (*Napellus*: *little turnip*, from the shape of the tuberous root; an ante-Linnæan name.) Eu.; extensively variable; very poisonous and source of a drug; summer.

4. *A. variegatum*, L. Erect but more or less slender, glabrous or nearly so, 2-6 ft.: root with globular tubers: lvs. divided to base into usually 3 main divisions  $\frac{1}{2}$  in. or more broad and these again lobed into flat segms.: fls. blue to whitish, in loose open short racemes which are often paniculate; helmet erect or strongly ascending, narrow, rounded at summit, without manifest or projecting visor. Eu.; summer.

5. *A. Fischeri*, Reichb. Tall and diffuse nearly or quite glabrous plant, 3-6 ft. and more high, with many tubers on the roots: lvs. large, divided to base or nearly so into 3 long-cuneate broad divisions which are again lobed and notched: fls. large, many in open broad few-fl. clusters, blue varying to whitish or partly white; helmet nearly or quite as broad as long, dome-shaped, ending in a distinct short spur-like visor: follicles 3. (Named by Reichenbach for his friend, D. Fischer.) Asia; summer and autumn.—The species is here defined broadly; to it are apparently to be referred stock grown as *A. bicolor*, *A. californicum*, *A. Wilsonii* (*A. Fischeri* var. *Wilsonii*, Davis), and probably *A. Stoerkianum*. (The true *A. Stoerkianum*, Reichb. = *A. Cammarum* var. *Stoerkianum*, W. Robinson, and is by some considered to be a hybrid.) Some of the stock known as *A. Napellus* may also belong in this group. *A. columbianum*, Nutt., of W. N. Amer., has been referred to *A. Fischeri* and it is only doubtfully distinct; also *A. autumnale*, Reichb., of N. China, and other names have been included under *A. Fischeri* as a variable species.

15. **PÆONIA**, L. PEONY. Some 25 or more strong perennial herbs and subshrubs, in the northern hemisphere, largely Asian, yielding ornamental subjects of high value.—Erect from tuberous or thickened underground parts: lvs. basal and cauline, large, alternate, ternate or pinnately compound or dissected: fls. large and mostly showy, usually terminal and solitary, but sometimes clustered, red, purple, white, or yellow; sepals 5 and persistent; petals 5-10, becoming more numerous in cult. kinds; stamens many; carpels 2-5 on a fleshy disk or base, becoming large dehiscent follicles; seeds large and mostly fleshy. (Pæo-nia: ancient name, said to commemorate a physician Pæon.)—One species, *P. Brownii*, Dougl., not very showy, is native Wyo. west. Most or all of the species have been introduced to cult., but very few enter into the hort. kinds. The shrubby or "tree" peonies are *P. suffruticosa*; the common herbaceous kinds are mostly forms of *P. albiflora*.

Plant shrubby: disk enlarging in fr., becoming  $\frac{3}{4}$  in. or more across.....1. *P. suffruticosa*

Plant herbaceous: disk little or not at all enlarging.

Lvs. dissected into very narrow parts.

Lfts. wholly glabrous above; segms. not narrowed at apex.....2. *P. tenuifolia*

Lfts. hairy along veins above; segms. narrowed and pointed.....3. *P. anomala*

Lvs. not dissected into narrow parts.

Carpels white-tomentose: lf.-segms. obtuse or short-acute.....4. *P. officinalis*

Carpels glabrous or nearly so (not tomentose): segms. acuminate...5. *P. albiflora*

1. *P. suffruticosa*, Andr. (*P. Moutan*, Sims). TREE PEONY. Little shrub, 3–5 ft. and sometimes higher, much branched: lvs. biternate, the lfts. stalked; ultimate lfts. or segms. ovate to broad-oval, 3–5-lobed, whitish beneath, the margins thick or somewhat revolute: fls. large, red, rose-red to white, mostly solitary; petals 8 or more, obovate, erose or crenate: follicles wide-spreading, densely hairy-pubescent. China; long in cult., producing double-fl. and many other vars.

2. *P. tenuifolia*, L. Roots large, fascicled, producing creeping stolons: st. simple and 1-fl., glabrous, very leafy, 12–20 in.: lvs. glabrous, ternate, cut into many narrow-linear not attenuate lobes: fls. dark crimson or purple; petals 8–10, elliptic-cuneate, 1½ in. or less long; stigmas red and spiral: follicles 3–4, erect-spreading, villous. S. E. Eu., Caucasus; sometimes seen in cult.; ornamental in foliage.

3. *P. anomala*, L. Root tuberous, without stolons: st. usually simple and 1-fl., glabrous, 2–3 ft.: lvs. biternate, glabrous beneath but sparsely hairy along nerves above, divided into many lanceolate or linear-lanceolate long-acute segms.: fl. very large, bright crimson; outer sepals often extended into lobed leafy ends; petals obovate to oblong: follicles 3–5, glabrous or tomentose. N. Eu., Asia.—Best known in var. *insignis*, Lynch, with many large lvs., showy magenta fls., crimson stigmas and red-pubescent follicles.

4. *P. officinalis*, L. St. stout, nearly or quite simple and 1-fl., 2–3 ft.: lvs. biternate or the lower ones more divided, somewhat pubescent and pale beneath but glabrous and dark above, ultimate lfts. more or less lobed, with oblong-lanceolate obtuse or short-acute segms. 1 in. or more broad: fls. dark crimson but running to whitish or yellowish; outer sepals lf.-like: petals about 8, obovate, 1½–2 in. broad; stamens yellow; stigmas crimson: follicles 2–3, erect or spreading, white-tomentose. S. Eu., W. Asia; infrequently cult., although it has given rise to double-fl. and other forms.

5. *P. albiflora*, Pallas. Root of fusiform tubers: st. simple and 1-fl. or branched at top and 2–5-fl., glabrous, 2–3½ ft.: lvs. biternate or the upper ones simpler, ultimate lfts. not lobed and oblong to lanceolate to elliptic, long-acute, usually veined red: peduncle long, often bracted: fls. large, white or pink but now much modified; outer sepals lf.-like; petals 8 or more, large and broad; stamens golden-yellow: follicles 3–5, usually glabrous. Siberia, China, Japan, the chief source of the contemporaneous herbaceous peonies, in many cultivars.

## 57. LARDIZABALACEÆ. LARDIZABALA FAMILY

Mostly climbing woody plants, of 8 genera and about 20 species native in the Himalayas, China, Japan, and Chile, a few of which are planted for ornament.—Lvs. compound, palmate, or sometimes pinnate: fls. polygamous or unisexual, with rudiments of the other sex organs present, regular, borne in racemes or solitary; sepals 6, petaloid, in 2 whorls, sometimes 3; petals none; stamens 6, free or united, hypogynous, usually with nectaries between sepals and stamens: fr. a berry, sometimes dehiscent, of 3 (rarely to 9 or more) separate carpels, ovules many, parietal.

**AKEBIA**, Decne. Two species of attractive glabrous twining shrubs from China and Japan.—Lvs. digitately 3–5-foliolate: fls. monœcious, in axillary racemes; sepals 3; stamens 6, free; carpels 3–12 with sessile stigma: fr. a large oblong berry with numerous seeds imbedded in a pulp, opening along the inner suture. (*Ake-bia*: the Japanese name.)

*A. quinata*, Decne. Climbing to 12 ft. and more; young branchlets purplish: lfts. 5, oval or oblong-obovate, up to 3 in. long, entire, emarginate, very dark green: fls. fragrant, purple, to 1 in. broad: berry 3–5 in. long, dark purple with glaucous bloom; seeds black. China, Japan; grown as a porch and arbor vine, affording good shade.—*A. lobata*, Decne., with 3 broad-ovate coarsely crenate lfts., is sometimes grown in choice collections.

## 58. BERBERIDACEÆ. BARBERRY FAMILY

Herbs or shrubs, many of them ornamental, of 10 or more genera and about 200 species, native in temp. regions of the northern hemisphere, but *Berberis* distributed from Cent. Asia to the mts. of trop. India and along the Andes



to Straits of Magellan.—Lvs. alternate, simple or compound: fls. solitary or racemed, bisexual, regular, hypogynous; sepals and petals usually imbricated in 2 or more series, the petals often changed to nectaries; stamens as many as petals and opposite them, rarely twice as many; anthers usually opening by 2 valves hinged at top; ovary superior, 1-celled, with few to many ovules; style short or none: fr. a berry or caps. *N*, Fig. 9, page 258.

- Plant a shrub.  
 Branches armed with spine-like lvs.: foliar lvs. simple.....1. *BERBERIS*  
 Branches unarmed: lvs. pinnate.....2. *MAHONIA*  
 Lfts. serrate.....3. *NANDINA*  
 Lfts. entire.....4. *EPIMEDIUM*  
 Plant an herb.....

1. **BERBERIS**, L. BARBERRY. Deciduous and evergreen shrubs cult. for their ornamental foliage which assumes brilliant colors in autumn, and the attractive fls. and fr.; nearly 175 species native in N. and S. Amer., Asia, Eu., N. Afr.—Wood and inner bark yellow: branches armed with spines which are morphologically lvs.: foliar or expanded lvs. simple: fls. yellow, in drooping racemes, fascicled or solitary; sepals 6, subtended by 2-3 bractlets; petals 6, usually with 2 glands near base; stamens 6, irritable: fr. a 1- to several-seeded berry. (Ber-beris: Arabic name.)

- A. Foliage deciduous.  
 B. Fls. in many-fld. racemes or panicles.  
 C. Under surface of lvs. green.  
 D. Diam. of fl. about  $\frac{1}{4}$  in.: lvs. dentate or sometimes entire in No. 2.  
 E. Young branches glabrous.....1. *B. vulgaris*  
 EE. Young branches pubescent.....2. *B. Prattii*  
 DD. Diam. of fls. about  $\frac{1}{2}$  in.: lvs. entire.....3. *B. Vernæ*  
 CC. Under surface of lvs. glaucous.....4. *B. brevipaniculata*  
 BB. Fls. in fascicles of 2-6.  
 C. Spines simple: young branchlets glabrous.....5. *B. Thunbergii*  
 CC. Spines 3-parted: young branchlets puberulous.....6. *B. Wilsonæ*  
 AA. Foliage evergreen.  
 B. Lvs. entire.....7. *B. stenophylla*  
 BB. Lvs. dentate.  
 C. Under surface of lvs. glaucous.....8. *B. verruculosa*  
 CC. Under surface of lvs. green.  
 D. Fls. in pendulous racemes longer than lvs.....9. *B. Darwinii*  
 DD. Fls. in fascicles of 2-15.  
 E. Fr. with glaucous bloom.  
 F. Seeds 1-2: fls. about  $\frac{1}{4}$  in. across.....10. *B. Juliana*  
 FF. Seeds 4: fls. about  $\frac{1}{2}$  in. across.....11. *B. Gagnepainii*  
 EE. Fr. black, without bloom.....12. *B. Sargentiana*

1. **B. vulgaris**, L. COMMON BARBERRY. Glabrous shrub to 8 ft. high; branches grooved, gray, upright or arching: lvs. oblong-spatulate or obovate, 1-2 in. long, bristly-dentate, grayish-green beneath, many on young shoots reduced to 3-parted spines: racemes pendulous, terminating lateral branches, many-fld.; fls. bright yellow: fr. oblong-ovoid, scarlet when ripe, acid. Eu. to E. Asia; naturalized in E. N. Amer.—A very variable species, running into forms with white or yellow fr., berries seedless or less acid, lvs. purple or variegated with white or with yellow margin.

2. **B. Prattii**, Schneid. Shrub to about 9 ft. high, the young branchlets pubescent, grooved, with 1-3-parted spines: lvs. oblong or obovate-oblong, 1-2 in. long, rounded or shortly acute at apex, entire or with small teeth above the middle: fr. salmon-red, about  $\frac{1}{4}$  in. across; seeds 2. (Bears the name of the collector, A. E. Pratt.) W. China.

3. **B. Vernæ**, Schneid. Shrub to about 3 ft. high, with glabrous grooved branchlets and simple spines: lvs. spatulate or oblanceolate,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, obtuse, entire: fls. in densely-fld. racemes, yellow, about  $\frac{1}{2}$  in. across: fr. red, about  $\frac{1}{2}$  in. across. (Bears the name of Miss Verna Berger.) W. China.

4. **B. brevipaniculata**, Schneid. To 6 ft. high, with glabrous grooved branchlets and 3-parted spines: lvs. obovate, to 1 $\frac{1}{4}$  in. long, rounded or abruptly pointed at apex, entire or with few teeth toward end, glaucous beneath: fls. in short panicles, pale yellow: fr. red with purplish bloom,  $\frac{1}{4}$  in. long. W. China.

5. *B. Thunbergii*, DC. Low dense shrub 2-5 ft. high; branches glabrous, deeply grooved, brown, with simple spines: lvs. obovate or spatulate, entire,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, glaucescent beneath: fls. 1-3, borne profusely the whole length of sts., pale yellow: fr. elliptic or nearly globose, bright red, persistent until following spring. (For Carl Peter Thunberg, page 699.) Japan.—Several vars. have been described and hybrids with *B. vulgaris*.

6. *B. Wilsonæ*, Hemsl. From 3-6 ft. high, with spreading reddish-brown puberulous branches armed with 3-parted slender spines: lvs. oblanceolate or narrowly obovate,  $\frac{1}{4}$ -1 in. long, rounded or acutish at apex, pale green and dull above, glaucous beneath: fls. in short-stalked umbels or dense clusters, golden-yellow: fr. globose, salmon-red. (Named for Mrs. E. H. Wilson, wife of the vice-director of the Arnold Arboretum.) W. China.

7. *B. stenophylla*, Mast. (*B. Darwinii*  $\times$  *B. empetrifolia*). From 1-3 ft. high, with slender arched branches armed with 3-parted spines: lvs. narrow-oblong, revolute at margins, spiny-pointed,  $\frac{1}{2}$ -1 $\frac{1}{4}$  in. long, coriaceous: fls. 2-6 in peduncled nodding umbels: fr. dark blue. Garden origin.

8. *B. verruculosa*, Hemsl. & Wils. Spreading evergreen shrub to 3 ft. high, with densely warty branches and slender 3-parted spines: lvs. elliptic or ovate-lanceolate,  $\frac{1}{2}$ -1 in. long, remotely spiny-toothed, glaucous beneath: fls. solitary or in small fascicles, golden-yellow,  $\frac{1}{2}$  in. across: fr. black with purplish bloom,  $\frac{1}{2}$  in. long. W. China.

9. *B. Darwinii*, Hook. From 1-3 ft. high; branches brown, pubescent when young: lvs. obovate, cuneate,  $\frac{3}{4}$ - $\frac{1}{2}$  in. long, spiny-toothed and usually 3-pointed at apex, coriaceous, glossy dark green above, light green below: fls. in pendulous racemes longer than lvs., 6-20-fld., orange-yellow; style as long as ovary: fr. dark purple. (After Charles Darwin, 1809-1882, naturalist.) Chile to Patagonia.

10. *B. Julianæ*, Schneid. To 6 ft. high, with glabrous branchlets and 3-parted spines: lvs. ovate to lanceolate, 1-3 in. long, acute, spiny-toothed: fls. in fascicles of about 15, yellow, about  $\frac{1}{2}$  in. across: fr. black, bloomy, about  $\frac{1}{2}$  in. wide; seeds usually 1. (Named for Mrs. C. K. Schneider.) W. China.

11. *B. Gagnepaini*, Schneid. To 6 ft. high, with glabrous branchlets and 3-parted spines: lvs. narrow-lanceolate,  $1\frac{1}{2}$ -3 $\frac{1}{2}$  in. long, spiny-toothed with revolute margins, indistinctly veined beneath: fls. in fascicles of 3-8, bright yellow,  $\frac{1}{2}$  in. across: fr. bluish-black, bloomy,  $\frac{1}{4}$  in. across; seeds 4. (Bears the name of Francois Gagnepain, contemporaneous French botanist.) China.

12. *B. Sargentiana*, Schneid. To 6 ft. high; branches grayish-brown, armed with 3-parted spines: lvs. elliptic-oblong to oblong-lanceolate, to 4 in. long, densely spiny-serrate, coriaceous, dark green above, light green and distinctly veined below: fls. 2-6, fascicled, pale yellow: fr. globose-ovoid, black at maturity, with sessile stigma. (After C. S. Sargent, director of the Arnold Arboretum.) W. China.

2. **MAHONIA**, Nutt. (*Odostemon*, Raf.). Evergreen shrubs, of about 45 species native in N. and Cent. Amer. and E. and S. E. Asia; grown for the handsome foliage and yellow fls.—A segregate from *Berberis*, differing in having unarmed branches, pinnate lvs., the many-fld. infl. springing from axils of bud-scales, and the 9 sepals. (Maho-nia: after Bernard M'Mahon, 1775-1816, American horticulturist.)

Lvs. rounded or truncate at base, oblong or ovate.

Lfts. 3-9; teeth many.

Plant 3-6 ft. high.....1. *M. Aquifolium*

Plant rarely over 1 ft. high.....2. *M. repens*

Lfts. 9-13; teeth few.....3. *M. japonica*

Lvs. cuneate at base, lanceolate.....4. *M. Fortunei*

1. *M. Aquifolium*, Nutt. (*Berberis Aquifolium*, Pursh). From 3-6 ft. high: lfts. 5-9, oblong or oblong-ovate, acute to rounded at apex, rounded or truncate at base, spinulose-dentate,  $1\frac{1}{2}$ -4 in. long, coriaceous, shiny above, pale green beneath: racemes erect, fascicled: berries small, blue. (*Aquifolium*: like *Ilex Aquifolium*.) B. C. to Calif.—Several foliage forms have been described.

2. *M. repens*, Don (*Berberis repens*, Lindl.). Very similar to the above but rarely over 1 ft. high: lfts. 3-7, roundish-ovate or ovate, glaucous beneath, spinulose-dentate,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long. B. C. to Calif. and N. Mex.

3. *M. japonica*, DC. (*Berberis japonica*, Spreng.). Lfts. 9-13, rigid, to 5 in. or more long, roundish or ovate, truncate or subcordate at base, with 5-6 strong spiny teeth, the margins between spines reflexed, the terminal lft. larger and with more

spines, dark green slightly glaucous above: fls. in terminal fascicles, small; petals bifid at apex: fr. bluish-black. China, Himalayas; in Japan only cult.

4. *M. Fortunei*, Fedde (*Berberis Fortunei*, Lindl.). To 6 ft. high: lfts. 5-9, up to 6 in. long, narrow-lanceolate, cuneate, spinose-serrate with small appressed teeth, dark green above, light green beneath: racemes erect, fascicled, to 6 in. long. (Bears the name of Robert Fortune, page 447.) China.

3. *NANDINA*, Thunb. A small erect shrub grown for its bright red berries; 1 species in China and Japan.—Lvs. evergreen, 2- or 3-pinnately compound, the ultimate lfts. 1-5, entire: fls. small, in terminal panicles; sepals and petals many, the sepals gradually changing into petals which are larger and whiter than the somewhat leathery sepals; stamens 6, free; ovules 2. (Nandi-na: Japanese name.)

*N. domestica*, Thunb. To about 8 ft. high, the young growth often tinged with red: lfts. 1-2 in. long, turning red in winter: fls. white, the dry floral envelopes shelling and exposing the stamens: berries about  $\frac{1}{4}$  in. across.

4. *EPIMEDIUM*, L. Perennial almost woody herbs with creeping underground sts., grown in the border or rock-garden, of about 10 species in temp. regions of the northern hemisphere.—Lvs. 1-3-pinnate; lfts. denticulate: racemes simple or slightly branched, terminal or opposite the lvs.; sepals 8, petaloid, often colored; petals 4, in the form of nectaries, spurred or hooded; stamens 4, free: caps. opening by valve on back; seeds few. (Epime-dium: Greek like *Medion*, a plant said to grow in Media; a name from Dioscorides, retained by Linnæus.)

Spur double the length of the outer sepals: lvs. triternate.....1. *E. macranthum*  
Spur or sac very short: lvs. 1-ternate.....2. *E. Musschianum*

1. *E. macranthum*, Morr. & Deene. Lvs. triternate; lfts. cordate-ovate, unequal at base, sharply toothed, petioles hairy: racemes many-fl'd.; outer sepals often bright red, persistent; inner petals violet, with long white deflexed spurs. Japan.—Several color vars. are advertised, having pure white fls., white fls. tinged with rose, and violet spurs.

2. *E. Musschianum*, Morr. & Deene. Lvs. only 1-ternate; lfts. cordate, sharply toothed; fl.-bearing lvs. twice as long as others, sheathed at base by several inflated colored stipules: fls. white or pale yellow, drooping; spurs or sacs very short, only one-third or less length of petals; stamens yellow, half as long as petals. (After J. H. Mussche, head gardener in 1834 at the Univ. of Ghent.) Japan.

## 59. MAGNOLIACEÆ. MAGNOLIA FAMILY

Ten genera of woody plants, 80 or more species, in trop., sub trop., and temp. parts of N. Amer. and Asia, including highly ornamental flowering trees and shrubs.—Lvs. alternate, mostly entire, pinnate-veined; stipules large (when present) and inclosing the budding lf., leaving characteristic scars: fls. with all parts present (dicæcious or monæcious as an exception), free and mostly distinct, the envelopes imbricated and deciduous and usually in whorls of 3, the petals 6 to many; stamens commonly numerous, with adnate anthers; carpels typically many and imbricated on an elongated receptacle, ovules 1 or 2 or sometimes more: fr. a follicle or samara, often all of them aggregated into a cone-like body.—Schizandra is an anomalous member of the family, comprising twining dicæcious or monæcious shrubs of Asia and N. Amer., not horticultural. To this family belongs the noble tulip-tree or whitewood (*Liriodendron tulipifera*, L.) of E. N. Amer., attaining a height of nearly 200 ft., sometimes planted.

Stipules present and prominent, inclosing the buds: carpels many, imbricated on a spike-like receptacle.

Carpel-bearing receptacle sessile within the fl.....1. *MAGNOLIA*  
Carpel-bearing body manifestly stalked within the fl.....2. *MICHELIA*  
Stipules absent: carpels few, in a single whorl.....3. *ILICIMUM*

1. **MAGNOLIA**, L. About 30 species of trees and tall shrubs in E. N. Amer., S. Mex., and Asia, some of them well-known ornamentals.—Evergreen or deciduous: lvs. mostly entire: fls. commonly showy, white, yellow, rose, or purple, appearing with or before the lvs., terminal; sepals 3 and petals 6–12; anthers falling early; carpels many, ovate, aggregated on a sessile receptacle or gynophore, more or less coherent into a cone-like somewhat fleshy brownish or scarlet body, each carpel dehiscent and 2-seeded (or by abortion 1-seeded). the seeds for a time suspended on thread-like cords. (Magnolia: bears the name of Pierre Magnol, 1638–1715, botanist of Montpelier.)

- A. The early blooming magnolias: fls. appearing in advance of the lvs. or with the earliest foliage.
  - B. Sepals not distinct, i.e., sepals and petals alike.
    - c. Petals (and sepals) usually as many as a dozen, narrow..... 1. *M. stellata*
    - cc. Petals 9, broad and large..... 2. *M. denudata*
  - BB. Sepals 3, differentiated, i.e., shorter and narrower than petals.
    - c. Fls. clear white..... 3. *M. Kobus*
    - cc. Fls. purple or bluish.
      - d. Petals three times or more as long as sepals, purple outside .. 4. *M. liliflora*
      - dd. Petals usually about twice as long as sepals, lighter colored or almost white outside..... 5. *M. Soulangeana* [and hybrids]
- AA. The late-blooming magnolias: fls. appearing after the lvs. or with the full-grown foliage.
  - B. Fls. greenish or yellow, small, not showy..... 6. *M. acuminata* (and [*M. cordata*])
  - BB. Fls. white, showy.
    - c. Lvs. cordate at base, 18 in. or more long..... 7. *M. macrophylla*
    - cc. Lvs. smaller, narrowed at base, or only subcordate.
      - d. Plant with thick stiff glossy evergreen foliage..... 8. *M. grandiflora*
      - dd. Plant with thin, deciduous or only semi-persistent foliage.
        - e. Foliage crowded at end of branches..... 9. *M. tripetala*
    - EE. Foliage scattered.
      - f. Diam. of fls. 6–7 in..... 10. *M. hypoleuca*
      - FF. Diam. of fls. 2–3 in..... 11. *M. virginiana*

1. ***M. stellata***, Maxim. (*M. Halleana*, Parsons). STARRY MAGNOLIA. Glabrous shrub or small tree, blooming in advance of lvs. from furry buds: lvs. oblong-obovate to elliptic, 2–5 in. long, obtuse or short-pointed, narrowed to short petiole, dull green above and pubescent on veins beneath when young: fls. 3 in. across, white or with faint streaks of pink (or sometimes suffused pink outside), fragrant; sepals and petals alike, usually 12 or more, 1½ in. long, oblong or oblanceolate: fr. an interrupted cone, with few pea-like scarlet seeds usually only 1 in a carpel. Japan.

2. ***M. denudata***, Desr. (*M. conspicua*, Salisb. *M. Yulan*, Desf. *M. precia*, Corr.). Tree, becoming 50 ft. high, with large fls. in advance of lvs. from hairy-furry buds: lvs. usually obovate, the apex broad-rounded or even retuse with a short stout point, 4–7 in. long and 3–4 in. broad, pubescent beneath when young: fls. about 5–6 in. across and cup-shaped but broader if fully opened, white (a purplish var.), fragrant; petals and sepals 9, similar, obovate or obovate-oblong, obtuse, concave, thick: fr. 3–4 in. long. China.

3. ***M. Kobus***, Thunb. Very hardy and vigorous tall tree, producing white fls. in advance of foliage: lvs. broad obovate, 3–6 in. long, abruptly pointed, tapering below, pubescent below when young: fls. 4–5 in. across, with 3 very small and narrow sepals; petals 6, thin and spreading: fr. 4–5 in. long, dark brown. (Kobus: Japanese name.) Japan.

4. ***M. liliflora***, Desr. (*M. obovata*, Willd., not Thunb.). Large often tree-like shrub, blooming in advance of foliage: lvs. obovate or obovate-oblong to nearly oval, 3–6 or 7 in. long, abruptly contracted into short point, pubescent beneath when young: fls. lily-shaped, purple outside but whitish within, 3–4 in. long, slightly fragrant; sepals 3, about one-third or less length of the few oblong-obovate petals: fr. broad-oblong, brownish. China, Japan.

5. ***M. Soulangeana***, Soul. Hybrid of *M. denudata* and *M. liliflora*, intermediate between the parents, and the most popular of the precocious-blooming magnolias, being hardy and floriferous in the N.: large shrub or little tree, with broad-ovate to obovate to broad-oblong abruptly short-pointed lvs.: fls. open-bell-shaped, 4–6 in. across, purplish or rose-colored outside and white within, little if at all fragrant; sepals usually colored and half as long as petals but sometimes small and greenish; petals few, oblong-ovate to obovate. (Dedicated to the Chevalier Soulange-Bodin,



who raised the hybrid in his garden in France.)—There are many races, often sold under separate specific names: Var. *alba superba*, Hort., white-flid.: var. *Alexandrina*, Hort., very early, fls. white inside and deep purple outside toward base; var. *Lennei*, Rehd., more shrubby, lvs. large, with large fls. deep crimson outside; var. *Norbertiana*, Hort., late, fls. white and light purple, foliage showy; var. *rustica*, Hort., fls. deep purple outside; var. *speciosa*, Hort., fls. white within, striped purple outside, later than *M. Soulangeana* and a little smaller, more durable.

6. *M. acuminata*, L. CUCUMBER-TREE. Large commanding tree reaching nearly 100 ft., with gray-brown deeply furrowed bark and glabrous branchlets: lvs. oblong-ovate to broad-oval to nearly obovate, 6–10 in. long, acuminate, obtuse or somewhat rounded at base: fls. with the lvs., glaucous-green or -greenish-yellow, 2–3 in. high, not showy, acute sepals reflexing; petals 6, ovate or obovate: fr. ("cucumber") 3–4 in. long, oblong or cylindric, becoming pink or red. Forest tree, Ont. to Ala. and somewhat westward, and often planted.—*M. cordata*, Michx. (*M. acuminata* var. *cordata*, Sarg.), native in Ga. and known in cult., has ovate or oval not acuminate lvs. more pubescent beneath and somewhat cordate on young shoots, pubescent branches and smaller canary-yellow fls.; hardy N.

7. *M. macrophylla*, Michx. LARGE-LEAVED CUCUMBER-TREE. Spreading shrub or tree to 50 ft., with pubescent branchlets: lvs. very large, 1–3 ft. long, oblong-obovate, obtuse, auriculate-cordate at base, canescent beneath: fls. cup-shaped, 10–12 in. across, white, fragrant, appearing with the lvs.; sepals narrower than the 6 ovate petals: fr. 2½–3 in. long, ovoid or nearly globular, rose-color at maturity. N. C. and Ky. south.

8. *M. grandiflora*, L. Great tree to 100 ft. and even more, with stiff evergreen lvs. shining green above and rusty-tomentose beneath, bearing large wax-like fragrant white fls. with the lvs. issuing from great silky-hairy conical buds: lvs. oval-oblong to obovate, tapering both ways, 4–8 in. long, sometimes becoming glabrate beneath: fls. 7–8 in. across, with petaloid sepals; petals 6–12, obovate; carpellary cone prominent: fr. cylindric, 3–4 in. long, heavy. Near the coast, N. C. to Fla. and Tex.; a well-known tree, commonly planted S., sometimes in named vars.

9. *M. tripetala*, L. (*M. Umbrella*, Lam.). UMBRELLA-TREE. Medium-sized branching tree to 40 ft.: lvs. crowded at the ends of branches, oblong-obovate or somewhat narrower, 1–2 ft. long, short-acute, narrowed to short petiole, pubescent beneath when young: fls. white, 6–10 in. across, cup-shaped, with unpleasant odor, appearing when lvs. are well grown; sepals light green, reflexing; petals 6 or 9, oblong-obovate: fr. oval-oblong or ovoid, 3–4 in. long, rose-colored at maturity. Pa. to Ala. and southwest.

10. *M. hypoleuca*, Sieb. & Zucc. (*M. obovata*, Thunb.). Great tree to 100 ft., with purplish branchlets: lvs. obovate to obovate-oblong, 1 ft. long more or less, nearly or quite obtuse, glaucous and pubescent beneath: fls. white, 6–7 in. across, appearing with the foliage, cup-shaped, fragrant; petals 6–9; filaments purple: fr. oblong-cylindric, 6–8 in., scarlet. Japan.

11. *M. virginiana*, L. (*M. glauca*, L.). SWEET BAY. Large shrub or small tree evergreen S. but deciduous N.: lvs. oblong or elliptic, 3–6 in. long, obtuse or nearly so, prominently glaucous-gray beneath: fls. white, globose, fragrant, 2–3 in. across, opening for a long time after lvs. appear; sepals obtuse, somewhat shorter than the 9–12 broad-obovate petals: fr. ellipsoidal, 1–2 in. long, pink. Mass. to Fla. and Tex., near the coast; an attractive plant.

2. *MICHELIA*, L. About a dozen Asian trees and shrubs, differing technically from *Magnolia* in the mostly axillary infl., the carpel-bearing receptacle or gynophore distinctly stalked in the fl.; ovules usually more than 2 in each carpel. (Miche-lia: Peter A. Michel was a Florentine botanist, 1679–1737.)

*M. fuscata*, Blume (*Magnolia fuscata*, Andr.). BANANA-SHRUB. Large evergreen bush, 10–15 ft., much branched but compact, the branchlets prominently brown-hairy: lvs. elliptic to broad-oval or oval-oblong, rather bluntly pointed, becoming nearly or quite glabrous beneath, glossy above: fls. erect, 1–1½ in. across, brownish-yellow edged carmine or maroon, with pronounced banana fragrance, produced in spring and early summer; sepals and petals narrow-oblong; gynophore equaling or exceeding the linear anthers. China; useful shrub in southern states.—*M. Champaca*, L., of the Himalayan region, is perhaps planted far S.: it is a tall tree with oblong-ovate or lance-ovate lvs. 8–10 in. long, thick, shining above, long-pointed: fls. 2 in. or less across, yellowish-brown, very fragrant.

3. *ILLICIUM*, L. Two shrubs in the S. E. U. S., and about a score of shrubs and small trees in Asia; one is widely planted in tropics and subtropics.—

Aromatic, evergreen, glabrous, with short-petioled entire lvs.: fls. bisexual, solitary or in 3's in the axils, small, inclined or nodding, yellow or purplish; sepals 3-6, soon falling; petals 9 or more; stamens few or many; carpels few or many, 1-ovuled, in a short whorl within the fl., becoming dry and woody tardily dehiscent follicles. (*Illicium*: the Latin word for *allurement* or *that which entices*, from the agreeable odor.)—One of the species, *I. verum*, Hook. f., China, is the star-anise; probably not cult.

*I. anisatum*, L. (*I. religiosum*, Sieb. & Zucc.). Small tree: lvs. alternate, elliptic, about 3 in. long, somewhat acuminate but obtuse: fls. mostly solitary, nearly or quite sessile, not fragrant; petals many, narrow. Japan; grown in southern states.

## 60. CALYCANTHACEÆ. CALYCANTHUS FAMILY

Two genera and about 6 species of shrubs with aromatic bark, native in N. Amer. and E. Asia.—Lvs. opposite, entire, short-petioled, exstipulate: fls. solitary, on lateral leafy branches, bisexual, regular; sepals and petals similar, imbricated in many series; stamens many, inserted on the receptacle, the filaments short; carpels numerous, distinct, inserted on the inner face of the hollow receptacle, each 1-celled and 1-2-ovuled; style filiform: fr. consisting of many 1-seeded achenes completely inclosed by the ovoid or pyriform receptacle. *O*, Fig. 9, page 258.

Stamens many: fls. brownish-purple.....1. *CALYCANTHUS*  
Stamens 5 or 6: fls. yellow.....2. *MERATIA*

1. *CALYCANTHUS*, L. (*Butneria*, Duham.). CAROLINA ALLSPICE. SWEET-SCENTED SHRUB. Four species of deciduous shrubs native in N. Amer., often grown for ornament and the sweet fragrance of the fls.—Winter-buds small, naked: fls. large, terminal on leafy branches; sepals and petals brownish-purple; stamens many. (*Calycanthus*: from Greek for *calyx* and *flower*, referring to the colored calyx.)

Lvs. densely pubescent beneath.....1. *C. floridus*  
Lvs. glabrous or nearly so beneath.....2. *C. fertilis*  
Fls. 1½ in. across: fr. contracted at mouth.....3. *C. occidentalis*  
Fls. 3 in. across: fr. not contracted at mouth.....3. *C. occidentalis*

1. *C. floridus*, L. From 3-6 ft. or more high, with branchlets and petioles pubescent: lvs. oval or ovate, acute or obtuse, dark green above, pale or grayish-green and densely pubescent beneath: fls. about 2 in. across, fragrant, dark reddish-brown: fr. obovoid or oblong, contracted at mouth. Va. to Fla.

2. *C. fertilis*, Walt. (*C. lævigatus*, Willd.). From 3-6 ft. or more high, with branches and petioles nearly glabrous: lvs. usually elliptic or oblong, acute or acuminate, dark green above, glaucous and glabrous or nearly so beneath: fls. 1½ in. across, not fragrant, reddish-brown: fr. ovoid, much contracted at mouth. Alleghanies, Ga. to N. C. and Ala.

3. *C. occidentalis*, Hook. & Arn. (*C. macrophyllus*, Hort.). Tall erect shrub to 12 ft. high: lvs. ovate to oblong-lanceolate, acute, green and sometimes slightly pubescent beneath: fls. 3 in. across, slightly fragrant, light brown: fr. campanulate, not markedly contracted at mouth. Calif.

2. *MERATIA*, Lois. (*Chimonanthus*, Lindl.). Two species of evergreen or deciduous shrubs in China and Japan, one of which is grown for ornament.—Often united with *Calycanthus* but differing in its scaly winter-buds, the yellow fls. appearing long before the lvs. on scaly branchlets axillary on branches of the previous year, and the 5 or 6 stamens. (*Mera-tia*: after Francois Victor Merat, 1780-1851, French physician and botanist.)

*M. præcox*, Rehd. & Wils. Deciduous shrub from 3-6 ft. high: lvs. elliptic-ovate to oblong-lanceolate, acuminate, bright green and lustrous above, glabrous beneath: fls. ¾-1½ in. across, fragrant, yellow, the inner sepals striped purplish-brown. China, Japan.—There is a form with larger brighter-colored fls.

# 61. ANNONACEÆ. CUSTARD-APPLE FAMILY

Probably 600 species of shrubs and trees, in 40-50 genera, in the tropics of Old and New World, with extensions into temp. regions, some of them grown for edible fr., for ornament, and for perfume.—Lvs. alternate, simple, entire: fls. mostly bisexual, regular but of odd form or appearance, often in tones of brown and tawny-yellow, for the most part not showy; sepals and petals often much alike; sepals 3 or calyx 3-lobed; petals usually 6, mostly valvate; stamens many, with long adnate anthers disposed spirally; carpels usually many and separate, ovules 1 to several, in some genera attached on an elongated receptacle and becoming an aggregate fleshy syncarp in which the seeds (carpels) are imbedded, but fr. in other genera dry or capsular.—The genus *Asimina*, of E. N. Amer., yields 6 species, one of which bears the pawpaw fr. of temp. regions: *A. triloba*, Dunal, growing as far north as N. Y. and Mich., sometimes planted in grounds; it is a large bush or small tree producing a fleshy large-seeded fr. 2-5 in. long, fls. brown to red.

- |   |               |
|---|---------------|
| Fr. a fleshy syncarp or "apple" formed by the fusion of carpels and receptacle..... | 1. ANNONA     |
| Fr. a cluster of distinct usually dry carpels.....                                  | 2. CANANGA    |
| Plant a tree.....   | 3. ARTABOTRYS |
| Plant climbing.....   |               |

1. *ANNONA*, L. CUSTARD-APPLE. More than 50 shrubs and trees, mostly in trop. Amer., some of which yield important edible frs.—Lvs. firm or coriaceous, without stipules, deciduous or persistent: fls. super-axillary, often opposite the lvs., solitary or in clusters; calyx usually tubular and 3-parted; petals 6 in 2 series, the inner series sometimes represented by scales or even wanting; stamens many, crowded, with fleshy filaments bearing pollen-sacs; carpels many, 1-ovuled, crowded: syncarp large and fleshy, formed by fusion of pistils and receptacle. (Anno-na: Latinized from native name.)—In the American tropics several species of *Annona* are known for their edible frs. and they are often planted; within the region of the U. S. they are of less importance although grown more or less by amateurs and experimentally. One species, *A. glabra*, L., the Pond-Apple, of no value for fr., is native in S. Fla. and southward.

- |  |                         |
|--|-------------------------|
| Inner petals nearly as large as outer ones: fr. spiny.....           | 1. <i>A. muricata</i>   |
| Inner petals minute and scale-like: fr. without spiny processes..... |                         |
| Lvs. velvety-pubescent beneath.....                                  | 2. <i>A. Cherimola</i>  |
| Lvs. not velvety beneath.....  |                         |
| Fr. of loosely cohering carpels that separate and fall apart.....    | 3. <i>A. squamosa</i>   |
| Fr. with solid exterior, the carpels marked by depressions.....      | 4. <i>A. reticulata</i> |

1. *A. muricata*, L. SOURSOP. GUANABANA. Small branching tree, evergreen: lvs. thick, obovate-oblong to elliptic, 2-5 in. long, short-acute, shining above and becoming glabrous beneath: fls. about 1½ in. or more across; exterior petals thick and valvate, interior ones thinner and somewhat smaller and imbricate: fr. 6-8 in. or more long, ovoid, more or less depressed or heart-shaped at base, dark green, with very many soft spines pointing toward apex, with slightly acid white juicy pulp. Trop. Amer.; now wide-spread and frequently planted; used in making a drink, in flavoring, and for jelly and conserves.

2. *A. Cherimola*, Mill. CHERIMOYA. Small erect or somewhat spreading tree to 25 ft., with grayish-pubescent branchlets: lvs. deciduous, ovate to ovate-lanceolate, 4-10 in. long, obtuse or nearly so, dull above, velvety-pubescent beneath: fls. solitary or 2 or 3 together, nodding on short peduncles, long and narrow, about 1 in. long, brown- or yellowish-tomentose outside; outer petals narrow, inner ones very small and scale-like: fr. of many kinds in the cult. races, from nearly globular to ovoid to conical, 3-5 in. long, sometimes nearly smooth and with finger-print depressions, sometimes with tubercles marking the carpels, the pulp white, somewhat acid, delicious, the seeds readily separated from it. (*Cherimola* is an adaptation of its aboriginal name.) Andes of Peru and adjacent regions but widely spread in cult., subtropical.

3. *A. squamosa*, L. SUGAR-APPLE. SWEETSOP. Small branching tree to 20 ft.: lvs. more or less distichous, deciduous, lanceolate to oblong-lanceolate, 3-6 in. long, short-acute, dull above, lightly hairy when young but becoming glabrous: fls. 2-4 together or sometimes solitary, narrow, about  $\frac{3}{4}$ -1 in. long, erect, greenish-yellow; exterior petals narrow, thick; interior ones minute: fr. globular, cordate-ovoid or conical, 2-3 in. diam. (size of orange), yellowish-green, glaucous, comprised of loosely cohering rounded carpels that readily fall apart, the pulp custard-like and very sweet. Trop. Amer., widely dispersed in cult.; fr. used in sherbets and for jellies and preserves.

4. *A. reticulata*, L. COMMON CUSTARD-APPLE. BULLOCKS-HEART. Small branching tree to 25 ft., with gray-pubescent growth becoming glabrate: lvs. mostly close together, deciduous or semi-deciduous, lanceolate to oblong-lanceolate, 4-8 in. long, long-acuminate, glabrous or nearly so: fls. several on nodding peduncles, narrow, about 1 in. long; exterior petals fleshy, yellowish, the interior ones very small and scale-like: fr. heart-shaped or nearly globular, 3-5 in. diam., smooth, the carpels shown by rhomboid areas, parts not separating; pulp tallow-like, adhering to seeds. Trop. Amer., now wide-spread; although much planted, the fr. is inferior to cherimoya and sugar-apple.

2. *CANANGA*, Hook. f. & Thoms. (*Canangium*, Baill.). Two or 3 trees in Malaya, prized for the fragrant extracts.—Fls. rather large, in axillary fascicles; sepals 3, ovate and valvate; petals 6 in 2 series, long and flat and nearly equal; stamens many, crowded, the anthers with connectives prolonged into a point; carpels many in 2 series, maturing into several oblong stalked fleshy many-seeded frs. (Canan-ga: from a native name.)

*C. odorata*, Hook. f. & Thoms. YLANG-YLANG, fls. the source of the famous perfume of the Pacific Isls.; sometimes planted in S. Fla. Tree of medium to rather large size with somewhat drooping branches: lvs. oblong-ovate, 6-8 in. long, long-acuminate with sharp point, glossy above, slightly pubescent beneath: fls. many, very fragrant, greenish to yellowish, narrow, hanging; sepals ovate, pubescent; petals lanceolate, acute, 2 in. long more or less: frs. nearly 1 in. long, greenish, oblong-cylindric. S. India, Java, and the Philippines.

3. *ARTABOTRYS*, R. Br. About 40 woody trop. climbers or semi-scandent shrubs, known for their very fragrant fls.—Climbing by means of thickened peduncles that hook or grip the support: lvs. evergreen, glabrous: fls. remarkable for a constriction in the corolla above the stamens, beyond which the 6 petals (in 2 series) are free and either spreading or somewhat incurved; stamens packed together; carpels several, rarely many, 2-ovuled: fr. of separate olive-like carpels clustered on the hardened receptacle. (Artabo-try: Greek combination, *hanging grapes*, from the suspended frs.)

*A. odoratissimus*, R. Br. CLIMBING YLANG-YLANG. Strong climber or scrambler, the young growth becoming glabrous: lvs. oblong to broad-lanceolate, 3-6 in. long, acuminate but with a blunt point, glossy above: fls. 1 or 2 on the hooked peduncle, greenish or yellowish, very fragrant; petals becoming  $1\frac{1}{2}$  to about 2 in. long, constricted near base: fr. of a few clustered yellow smooth fragrant pointed drupe-like carpels about  $1\frac{1}{4}$  in. long. India to China and the Philippines; sometimes planted in S. Fla.

## 62. MYRISTICACEÆ. NUTMEG FAMILY

Eight genera and more than 100 species of evergreen trees, widely distributed in the tropics, the following species yielding the well-known nutmeg and mace.—Lvs. alternate, entire, exstipulate: fls. small, dioecious, regular, in axillary fascicles or umbels; calyx 3-lobed; corolla none; stamens 2-30, monadelphous; ovary 1, sessile and superior, free, 1-celled, 1-ovuled; style short or none: fr. fleshy, dehiscing into 2, rarely 4, valves; seed with a fleshy laciniate aril.

*MYRISTICA*, L. NUTMEG. About 80 species in farther India, Australia and Pacific Isls.—Characters mainly of the family: lvs. usually white or glaucous beneath, the 3 nerves not parallel and often sunken above: filaments



united into a column, the anthers elongated and connate. (Myristica: from Greek, alluding to aromatic qualities of these plants.)

**M. fragrans**, Houtt. Tall glabrous tree: lvs. elliptic- or oblong-lanceolate, 2-5 in. long, petioled, pale yellow-brown: fr. pyriform to nearly globular,  $1\frac{1}{2}$ -2 in. long, hanging, reddish or yellowish, splitting into 2 valves disclosing the scarlet aril or mace surrounding the nutmeg which is inclosed in a hard shell. Molucca; planted widely in tropics, and sometimes seen in economic collections under glass.

### 63. LAURACEÆ. LAUREL FAMILY

About 40 genera and 1,000 species of aromatic trees and shrubs, of wide distribution in trop. and a smaller number in temp. regions; a few genera are cult. for ornament, and the avocado, cinnamon, and camphor are articles of commerce.—Lvs. alternate, rarely opposite, simple, usually leathery and evergreen, sometimes membranaceous and deciduous, punctate, exstipulate: fls. yellow or greenish, regular, bisexual or unisexual, the infl. various; calyx usually 6-parted, the segms. in 2 whorls; petals 0; stamens in 3-4 whorls of 3 each, some often reduced to staminodia, perigynous or epigynous; anthers 2-4-celled, opening by uplifting valves; ovary usually superior and free, rarely inferior, 1-celled, 1-ovuled; style filiform or short: fr. a berry or drupe, indehiscent.—The native Sassafras, *Sassafras variifolium*, Kuntze, is sometimes planted; its bright green twigs and oval, mitten-shaped or deeply 3-lobed lvs. are characteristic. The California Laurel, *Umbellularia californica*, Nutt., is planted as a shade tree in that state; it has evergreen oblong-lanceolate lvs. and purple frs. about the size and shape of a marble.

|   |               |
|---|---------------|
| Perfect stamens 12 or more.....           | 1. LAURUS     |
| Perfect stamens 9.....                    |               |
| Lvs. feather-veined.....                  | 2. PERSEA     |
| Lvs. strongly 3-nerved from the base..... | 3. CINNAMOMUM |

1. **LAURUS**, L. LAUREL. SWEET BAY. Two species of trees, one native in the Medit. region, the other in the Canary Isls. and Madeira; one widely grown as a tub-plant.—Fls. small, bisexual or diœcious, in small axillary umbels which in bud are inclosed in a globose involucre; calyx 4-parted; perfect stamens usually 12 or more, staminodia often present, usually 4 in fertile fls.; ovary scarcely sunk in the receptacle, the style short: fr. a small berry. (Laurus: ancient name.)

**L. nobilis**, L. Evergreen tree to 40 ft., but cult. as a tub-plant and sheared into various forms: lvs. stiff, dull green, lanceolate or oblong-lanceolate: fls. yellowish, inconspicuous, blooming in early spring: berries dark purple. Medit. region.—There are forms with curled, variegated, and willow-shaped lvs. This is the laurel of history. Other plants known as laurel are *Kalmia latifolia*, *Umbellularia californica*, and several species of *Prunus*, as *P. Laurocerasus*, *P. lusitanica*, and *P. caroliniana*.

2. **PERSEA**, Gaertn. Trees and shrubs, of about 50 species, native in N and S. Amer., a few from S. E. Asia, and 1 from the Canary Isls., including the avocado which is widely grown in the tropics for its edible frs.—Lvs. leathery, feather-veined: fls. bisexual, small, usually in panicles; calyx persistent, deeply 6-parted; stamens usually 12, in 4 series, the inner reduced to gland-like staminodia, anthers 4-celled; ovary sessile, tapering into slender style: fr. globose or oblong, baccate. (Per-sea: ancient name.)

|   |                         |
|---|-------------------------|
| Frs. large and fleshy, 2-8 in. long.                              |                         |
| Skin of fr. thick: lvs. not anise-scented.....                    | 1. <i>P. americana</i>  |
| Skin of fr. thin and soft: lvs. anise-scented.....                | 2. <i>P. drymifolia</i> |
| Frs. small and scarcely fleshy, about $\frac{3}{4}$ in. long..... | 3. <i>P. indica</i>     |

1. **P. americana**, Mill. (*P. gratissima*, Gaertn.). AVOCADO. Large broad-topped tree to 60 ft.: lvs. petioled, oblong- or elliptic-lanceolate to oval, 3-16 in. long, acute or truncate at base, usually somewhat glaucous below: fls. small, greenish,

shortly pedicellate, in broad compact panicles at the ends of the young branchlets; calyx slightly pubescent or almost glabrous; perfect stamens 9, with 2 oval flattened orange-colored glands at base of each: fr. large and fleshy, from 2-8 in. long, commonly pyriform, ovate or spherical, yellow-green to maroon and purple in color, the skin thick and woody. Trop. Amer.—Formerly called "alligator-pear." The Guatemalan avocado is a form of this species.

2. *P. drymifolia*, Cham. & Schlecht. MEXICAN AVOCADO. Very similar to the above but differs in its usually smaller anise-scented lvs. more glaucous below, densely pubescent calyx, and smaller frs. with thin soft skin. (Name suggests the foliage of *Drymis*.) Mex.

3. *P. indica*, Spreng. Handsome tree sometimes planted for ornament in southern regions: lvs. petioled, elliptic- or lanceolate-oblong, 3-8 in. long, attenuate-acute, glabrous: fls. small, white, in panicles 3-6 in. long, the peduncles compressed and the branches 3-5 fld.: fr. ovoid, about  $\frac{3}{4}$  in. long, scarcely fleshy, very dark blue. Canary Isls., Madeira, Azores.

3. CINNAMOMUM, Blume. More than 50 species of evergreen trees and shrubs native in Asia and Australia, a few of which are grown for ornament far S. and for their aromatic and medicinal products.—Lvs. opposite or sometimes alternate, strongly 3-nerved from the base: fls. small, usually bisexual or sometimes polygamous and then the staminate fls. smaller than pistillate, borne in axillary and subterminal panicles; calyx-tube short, the 6 segms. almost equal; perfect stamens 9 or less, in 3 unlike series, the 4th series of staminodes, anthers 4-celled; ovary sessile, tapering into style: fr. a berry, in the cup-like perianth the segms. of which are deciduous or persistent. (Cinnamomum: ancient Greek name.)—The species are not clearly distinguished.

- |   |                           |
|---|---------------------------|
| Buds inclosed by large imbricated scales..... | 1. <i>C. Camphora</i>     |
| Buds naked or with very small scales.         |                           |
| Lvs. opposite.                                |                           |
| Lf. caudate- or long-acuminate.....           | 2. <i>C. Cassia</i>       |
| Lf. obtuse or subacute.....                   | 3. <i>C. zeylanicum</i>   |
| Lvs., at least the upper, alternate.....      | 4. <i>C. pedunculatum</i> |

1. *C. Camphora*, Nees & Eberm. (*Camphora officinarum*, Nees). CAMPHOR-TREE. Stout dense-topped tree to 40 ft., with enlarged base, twigs and bruised lvs. having marked camphor odor: buds inclosed by orbicular imbricated scales: lvs. alternate, long-petioled, ovate-elliptic, acuminate, 2-5 in. long, pinkish on the young growths, smooth and shining above, whitish or glaucous beneath: fls. yellow, in axillary panicles shorter than the lvs.; perianth-lobes deciduous in age: fr. about  $\frac{3}{8}$  in. diam. China, Japan.

2. *C. Cassia*, Blume. CASSIA-BARK-TREE. Handsome tree with aromatic bark sometimes used as a substitute for cinnamon, young branches somewhat 4-angled: lvs. oblong to nearly lanceolate, stiff, 3-6 in. long, caudate- or long-acuminate, slender-petioled: fls. small, in axillary or terminal silky-tomentose panicles 3-6 in. long; perianth-lobes persistent in fr.: fr. size of a small pea. China.

3. *C. zeylanicum*, Breyn. CINNAMON-TREE. Tree to 20 or 30 ft., the bark yielding the cinnamon of commerce: lvs. ovate or ovate-lanceolate, very stiff, 4-7 in. long, obtuse or somewhat acute: fls. yellow-white, in loose somewhat silky panicles which often exceed the lvs.: fr.  $\frac{3}{8}$  in. long, dry, pointed. India, Malaya, and widely cult. in tropics.

4. *C. pedunculatum*, Presl. Glabrous tree: lvs., at least the upper, alternate, long-petioled, oblong-lanceolate, acuminate, 2-5 in. long: fls. in axillary or subterminal corymbs which almost equal the lvs.: fr. globose-ovoid, about  $\frac{1}{4}$  in. long. Japan.

## 64. PAPAVERACEÆ. POPPY FAMILY

About 25 genera and 115 species of herbs, rarely shrubs, of wide distribution but most abundant in the north temp. zone, many of them choice flower-garden subjects.—Juice usually milky and often colored: lvs. alternate, rarely the upper ones opposite or verticillate, entire or lobed or divided, exstipulate: fls. solitary or in clusters, bisexual, regular; sepals 2 or seldom 3, caducous;

petals 4-6, rarely more or wanting, deciduous, imbricated, often wrinkled; stamens numerous, in whorls, hypogynous, free, with filiform filaments; ovary free, of 2 to many carpels, usually 1-celled, many-ovuled, with parietal placentæ as many as the stigmas which are simple or divided, style short or none: fr. a caps. dehiscent by pores or valves.

- A. Foliage not spiny (in cult. kinds).
- B. Petals present, although deciduous.
- C. Lvs. not multifid, although sometimes pinnate.
- D. Stigma expanded and disk-like, extending over openings of caps. . . . . 1. PAPAVER
- DD. Stigma not expanded and disk-like.
- E. Fls. white. . . . . 2. ROMNEYA
- EE. Fls. yellow, red, or purple.
- F. Plant an herb.
- G. Fr. of many distinct linear carpels, finally breaking transversely between the seeds. . . . . 3. PLATYSTEMON
- GG. Fr. of united carpels.
- H. Caps. dehiscent by short teeth or valves at summit. . . . . 4. MECONOPSIS
- HH. Caps. dehiscent by valves to base.
- I. Fls. small,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across. . . . . 5. CHELIDONIUM
- II. Fls. 1–2 in. across. . . . . 6. GLAUCIUM
- FF. Plant a shrub. . . . . 7. DENDROMECON
- CC. Lvs. multifid.
- D. Sepals coherent, forming a hood which is pushed off over the bud as petals expand. . . . . 8. ESCHSCHOLZIA
- DD. Sepals separate. . . . . 9. HUNNEMANNIA
- BB. Petals 0. . . . . 10. MACLEAYA
- AA. Foliage spiny. . . . . 11. ARGEMONE

1. PAPAVER, L. POPPY. Probably about 50 species, although many more have been described, mostly in the Old World, but a few native in W. N. Amer.; poppies are amongst the best-known garden fls.—Annual, biennial, or perennial herbs, rarely subshrubs, hispid or glaucous, with milky juice: lvs. lobed or dissected: fls. showy, solitary on long peduncles, the buds nodding; sepals 2, rarely 3; petals usually 4; stamens many: caps. globose, ovoid or oblong, dehiscent under the top by transverse pores between the placentæ which project into center of caps., the stigmas united into a radiate persistent disk. (Papa-ver: old Latin name for the poppy.)

- Fls. on leafless scapes: lvs. all radical. . . . . 1. *P. nudicaule*
- Fls. on branching, more or less leafy sts.
- St.-lvs. clasping.
- Lvs. pinnately lobed. . . . . 2. *P. glaucum*
- Lvs. coarsely dentate, more or less lobed. . . . . 3. *P. somniferum*
- St.-lvs. not clasping.
- Peduncle with coarse appressed hairs.
- Fls. without bracts. . . . . 4. *P. orientale*
- Fls. subtended by large leafy bracts. . . . . 5. *P. bracteatum*
- Peduncle with weak spreading hairs. . . . . 6. *P. Rhæas*

1. *P. nudicaule*, L. ICELAND POPPY. Cespitose nearly stemless perennial, more or less hirsute, somewhat glaucous: lvs. all radical and petioled, pinnately lobed or cleft, the segms. oblong and entire or lobed: scapes erect, slender, much exceeding the lvs., usually about 1 ft. high; fls. fragrant, 1–3 in. across; petals obovate, sinuate, the 2 inner ones smaller, white with a yellow base or yellow with a greenish base, but often orange or reddish in cult.: caps. oblong or obovate-globose, usually densely hispid, about  $\frac{3}{4}$  in. long. Arctic regions in eastern and western hemispheres.—There are double-fl. kinds.

2. *P. glaucum*, Boiss. & Hausskn. TULIP POPPY. Glaucous annual, branching at the base, to about 2 ft. high, glabrous except a few short appressed bristles on peduncles: st.-lvs. clasping and cordate at base, radical lvs. narrowed into petiole, pinnately lobed or parted, the lobes triangular and usually dentate: fls. 3–4 in. across; petals scarlet, spotted at base, the 2 inner shorter, forming a loose cup: caps. about  $\frac{3}{4}$  in. long. Syria to Persia.

3. *P. somniferum*, L. OPIUM POPPY. Glaucous annual, glabrous or rarely slightly hairy, 2–4 ft. high: lower lvs. narrowed into short petiole, upper clasping, cordate, unequally and coarsely dentate or more or less lobed, 4–10 in. long, oblong: fls. 3–4 in. across; petals orbicular, entire, undulate or cut, from white through pink and red to purple, but not yellow or blue: caps. 1–2 in. long. Greece, Orient;

sparingly run wild in N. Amer.—Many double-fl'd. sorts are advertised, some with fringed petals, also many color cultivars. The species is widely grown for its caps. from the milky juice of which opium is derived.

4. *P. orientale*, L. ORIENTAL POPPY. Robust stiff-hairy perennial 3-4 ft. high: lvs. to 1 ft. long and regularly pinnatifid, the segms. oblong-lanceolate and sharply lobed or toothed: peduncles with coarse appressed white hairs; fls. 4-6 in. and more across; petals sometimes 6, obovate, narrowed below, scarlet with black spot at base: caps. about 1 in. long. Medit. region to Persia.—Runs into many variations, some without the dark spot, others double-fl'd., and many color vars. due to hybridizing with *P. bracteatum*.

5. *P. bracteatum*, Lindl. Similar to *P. orientale* but differing in having 2 large leafy bracts at the base of the fls., the blood-red petals not spotted or the claw dark violet. Medit. region to Persia.

6. *P. Rhœas*, L. CORN POPPY. Slender branching annual 1-3 ft. high, with spreading shaggy hairs or rarely glabrescent: lvs. short, more or less clustered at base of peduncles, irregularly pinnatifid and divided, rarely nearly entire, the segms. lanceolate and serrate: fls. 2 in. or more across; petals orbicular, entire or sometimes crenate and incised, cinnabar-red, deep purple to scarlet, rarely white, white or reddish margined, sometimes dark-spotted: caps. less than 1 in. long. (Rhœas: classical name for the corn poppy.) Eu. and Asia; run wild in N. Amer.—Very variable, and known to gardeners mostly in the cultivars. The most popular race in gardens is the Shirley poppy, in many kinds.

2. *ROMNEYA*, Harv. One species, or by some authors regarded as 2, an erect perennial herb or subshrub, native in S. Calif. and Mex., planted for the showy fls.—Glabrous and glaucous: sts. branching: lvs. petioled, pinnatifid: fls. large, white, solitary at the ends of the branches; sepals 3, with a broad membranaceous dorsal wing; petals 6, in 2 series; stamens many; stigmas numerous, connate at base into ring: caps. ovate, narrowed at top, densely covered with stiff yellowish bristles, dehiscing to the middle by 7-12 valves. (Rom-neya: after T. Romney Robinson, astronomer and discoverer of the plant about 1845.)

R. Coulteri, Harv. MATILJA POPPY. Much branched above, 3-8 ft. high: lvs. 2-4 in. long, lobes lanceolate, the terminal one 3-cleft, sparingly dentate, the margins sometimes slightly ciliate: fls. fragrant, about 6 in. across; calyx glabrous, somewhat beaked: caps. with spreading hairs. (Named after Thos. Coulter, 1793-1843, Irishman, collected in Mex. and Calif., 1831-3.) S. Calif.—Var. *trichocalyx*, Jepson (*T. trichocalyx*, Eastwood) may be in cult. It differs in its setose calyx which is beakless or nearly so.

3. *PLATYSTEMON*, Benth. Low annual herb, of 1 species in Calif., or by some authors divided into 60 species, sometimes grown in flower-gardens.—Branching at base, erect or decumbent, hirsute or glaucescent: lvs. narrow, entire, lower alternate, upper opposite or verticillate: fls. solitary, on erect elongated peduncles; sepals 3; petals 6 or sometimes more, deciduous or rarely persistent; stamens numerous, unequal, the filaments petal-like; ovaries 6-20 or more, distinct, with linear stigmas: fr. of 6-20 linear torulose carpels, distinct at maturity, finally breaking transversely between the seeds. (Platyste-mon: from Greek for *broad* and *stamen*, referring to the flattened filaments.)

*P. californicus*, Benth. CREAM-CUPS. From 6 in. to 1 ft. high: lvs. linear-oblong, sessile or clasping: fls. about 1 in. across, light yellow or cream-colored. Calif.

4. *MECONOPSIS*, Vig. Annual and perennial herbs, suitable for borders and rock-gardens; about 30 species in northern extra-trop. regions, mostly in Asia.—Juice yellow: lvs. entire, lobed or dissected, the radical petioled, the st.-lvs. short-stalked or sessile: fls. solitary or in cymose racemes or panicles, yellow, reddish, or blue; sepals 2; petals 4 or sometimes 5-9; stamens many; stigmas forming a globular mass on the 4- to many-carpelled ovary: caps.



oblong, club-shaped or rarely cylindrical, with 4 or more intruding placentæ, dehiscing by short teeth or valves near the summit. (*Meconop-sis*: Greek for *poppy-like*.)—Some of the recently discovered Asiatic species are likely to appear in the trade.

Fls. yellow.....1. *M. cambrica*  
Fls. red.....2. *M. heterophylla*

1. *M. cambrica*, Vig. WELSH POPPY. Erect branching perennial, forming large tufts with thick roots, 1-1½ ft. high, sparsely hairy or glabrescent: lvs. glaucous beneath, pinnate, the segms. ovate or lanceolate and dentate or lobed: fls. 2-3 in. across, pale yellow, on long peduncles which exceed the lvs. (Cambria: Cambrian or Welsh.) W. Eu.—There is a double-fl. var.

2. *M. heterophylla*, Benth. FLAMING POPPY. WIND POPPY. Glabrous slender annual 1-2 ft. high, with leafy laxly-branching sts.: lvs. irregularly pinnately parted, the segms. ovate and usually sinuately lobed, the upper segms. linear and often nearly entire: fls. on long slender peduncles, brick-red with purple center, ½-2 in. across. Calif., Nev., Ore.

5. *CHELIDONIUM*, L. CELANDINE. A monotypic genus native in temp. Eu. and Asia, comprising a biennial or perennial herb, often seen in old gardens, sometimes double-fl.—Erect, loosely-branching, with acrid saffron-colored juice: lvs. deeply pinnatifid, the segms. ovate or obovate, crenate or lobed, sometimes 2-pinnatifid: fls. in a small peduncled umbel; sepals 2; petals 4; stamens many; ovary of 2 carpels, the style very short with 2-lobed stigma: caps. linear, dehiscing from base upward. (*Chelido-nium*: Greek for *swallow*; the fls. bloom about the time the swallow comes.)

*C. majus*, L. From 2-4 ft. high: lvs. glaucous beneath: fls. yellow, ½-⅔ in. across: caps. 1-2 in. long. Eu.; naturalized in E. N. Amer. as a weed about yards.

6. *GLAUCIUM*, Mill. HORNED POPPY. SEA POPPY. A dozen or perhaps more species of chiefly biennial and perennial herbs, native in the Medit. region, one often grown for borders or edgings.—Glaucous, with saffron-colored juice: lvs. lobed or dissected: fls. large, solitary, on long peduncles, yellow or red; sepals 2; petals 4; stamens many; stigma almost sessile, 2-lobed: caps. very long and linear, 2-celled by a spongy false partition, dehiscient to the base. (*Glauc-ium*: from Greek, referring to the glaucous foliage.)

*G. flavum*, Crantz (*G. luteum*, Scop.). Stout, branching, 2-3 ft. high: lower lvs. pinnatifid and petioled, the upper clasping and sinuately lobed and toothed: fls. golden-yellow or orange, about 2 in. across: caps. 6-12 in. long. Eu.; naturalized in E. N. Amer.—There is a form with parti-colored fls. (var. *tricolor*).

7. *DENDROMECON*, Benth. One polymorphous species, or by some authors divided into 20 species; a shrub native in Calif., grown for its bright yellow fls.—Glabrous, branching, the juice not milky: lvs. rigid, entire: fls. solitary, terminal on the short branches; sepals 2; petals 4; stamens many, with short filaments; stigmas 2, sessile: caps. linear-curved, grooved, 2-4 in. long, dehiscing to the base by 2 valves the margins of which bear the placentæ. (*Dendrome-con*: from Greek for *tree* and *poppy*.)

*D. rigida*, Benth. BUSH POPPY. Rigid leafy shrub from 2-10 ft. high, with whitish bark: lvs. glaucescent, lanceolate to ovate-lanceolate, acute, mucronate, coriaceous, reticulately veined: fls. 1-2 in. across, golden-yellow. Calif., dry parts of Coast Ranges and Sierras.

8. *ESCHSCHOLZIA*, Cham. Annual or perennial herbs widely grown for their showy fls.; probably about a dozen species in W. N. Amer., or by some authors separated into more than 100 species.—Glabrous and glaucous, with watery juice: lvs. multifid: fls. large, solitary on long peduncles; receptacle prominently hollowed and surrounding base of pistil; sepals coherent into a narrow pointed hood which is pushed off over the bud as the petals expand;

petals 4, inserted on the receptacle together with the numerous stamens which have short filaments and linear anthers; style very short, stigma 4-6-lobed, spreading; caps. very long and slender, dehiscent by 2 valves from base to tip, after separating from receptacle. (Eschscholz-ia: after J. F. Eschscholtz, 1793-1831, member of Kotzebue's scientific expedition.)

**E. californica**, Cham. CALIFORNIA POPPY. Perennial but cult. as an annual, 1-2 ft. high, erect or diffuse: lvs. ternately dissected into linear or oblong segms., long-petioled: fls. 2-3 in. across, opening in sunshine, pale yellow to orange, deep orange at base of petals; rim of receptacle expanded: caps. 3-4 in. long, strongly ribbed. Calif., Ore.

9. **HUNNEMANNIA**, Sweet. MEXICAN TULIP POPPY. Perennial herb grown for its showy yellow fls., but usually treated as an annual; only 1 species in xerophytic regions of Mex.—Closely related to Eschscholzia but differing in the 2 separate sepals, the receptacle scarcely dilated, and the orange-colored stamens. (Hunneman-nia: John Hunneman, English botanist, died 1839.)

**H. fumariæfolia**, Sweet. Two ft. high: lvs. glaucous, ternately dissected into linear obtuse segms.: fls. 2-3 in. across, yellow: caps. about 4 in. long. (Fumariæfolia: referring to its resemblance to lvs. of Fumaria.)

10. **MACLEAYA**, R. Br. Two species of perennial herbs native in China and Japan, grown in the hardy border.—Erect, glaucescent, sometimes shrubby: lvs. petioled, pinnately-lobed, cordate at base, white-glaucous beneath: fls. in elongated terminal panicles; sepals 2, cream-colored; petals 0; stamens many, with filiform filaments not exceeding the anthers; style very short, the 2 stigmas at first connate with style, at length diverging: caps. ovoid, stalked, 2-valved, dehiscent to base, 1- to several-ovuled. (Maclea-ya: after Alex. Macleay, Colonial secretary of New S. Wales.)

**M. cordata**, R. Br. (*Bocconia cordata*, Willd. *B. japonica*, Hort.). PLUME POPPY. TREE CELANDINE. Five-8 ft. high: lvs. usually very large, long-petioled, heart-shaped, about 7-lobed, the lobes sinuate or dentate, glabrous or pubescent beneath: panicles sometimes 1 ft. long, on erect branches. China, Japan.

11. **ARGEMONE**, L. PRICKLY POPPY. Prickly herbs grown as annuals for their showy fls., of about 10 species in N., Cent. and S. Amer.—Robust and branching, glaucescent, with yellow juice: lvs. pinnatifid, the segms. sinuate-dentate with spiny teeth: fls. large; sepals 2 or 3, with horn-like appendage; petals 4-6; stamens many; carpels 4-6 with many-ovuled placenta, the style very short or none and 3-6-radiate stigma: caps. oblong, prickly, opening at top by 3-6 valves. (Argemo-ne: classical name for another plant.)

Caps. and sts. densely spiny.....1. *A. platyceras*  
Caps. and sts. only slightly spiny.....2. *A. grandiflora*

1. **A. platyceras**, Link & Otto. Whole plant very spiny, 1-4 ft. high: fls. 2 in. or more across, white or rarely purple, subtended by 2-3 leafy bracts: caps. 1-2 in. long, completely covered with rigid spines. N. and S. Amer.—Variable; a var. with rose fls. is advertised.

2. **A. grandiflora**, Sweet. Sts. glabrous or only slightly spiny, 1-3 ft. high: lvs. white-veined, only weakly spiny: fls. 3-6 near together, 2 or more in. across: caps. about 1 in. long, with a few spines. S. W. Mex.

## 65. FUMARIACEÆ. FUMITORY FAMILY

Five genera and about 170 species of herbaceous plants, mostly natives of the north temp. zone.—The family is closely allied to the Papaveraceæ with which it is often united, but differs in its watery juice, the irregular fls. with 2 small scale-like sepals, 4 petals in 2 series, one or both of the outer ones spurred or gibbous, the 2 inner smaller, crested and united over the stigma;

stamens 6, in 2 series, the filaments often united: fr. 1-seeded and indehiscent or a 2-valved several-seeded caps.

Corolla rounded or slightly cordate at base, the petals permanently united . . . 1. ADLUMIA  
Corolla deeply cordate at base, petals only slightly united . . . . . 2. DICENTRA

1. **ADLUMIA**, Raf. One climbing biennial, native in E. N. Amer., a vine ornamental both in foliage and fl.—Lvs. 3-pinnate, the lfts. delicate and cut-lobed: fls. in axillary drooping panicles; petals permanently united into a narrow cordate-ovate spongy corolla which is persistent and incloses the fr.; stamens monadelphous below, diadelphous above, adherent to corolla; stigma 2-crested: caps. oblong, slightly dehiscent by 2 valves, the seeds not crested. (Adlu-mia: Major John Adlum, 1759–1836, was an American grape experimenter.)

**A. fungosa**, Greene (*A. cirrhosa*, Raf.). CLIMBING FUMITORY. MOUNTAIN FRINGE. ALLEGHENY-VINE. Delicate vine climbing by the slender petioles: fls. about ½ in. long, white or purplish. Ont. to Mich., south to N. C.

2. **DICENTRA**, Bernh. (*Bikukulla*, Adans.). Perennial herbs of about 15 species in N. Amer. and Asia, a few grown in the border for their attractive fls. and foliage.—Habit erect, diffuse, or sometimes climbing, often stemless, with rhizome horizontal and branching or more or less bulbous: lvs. ternately compound or dissected: fls. in racemes; pedicels 2-bracted; petals slightly united into a heart-shaped or 2-spurred corolla; style slender, the stigma 2–4-crested or sometimes 2–4-horned: caps. oblong or linear, dehiscent to the base by 2 valves, the seeds crested. (Dicen-tra: from Greek for *two-spurred*.)

Racemes simple . . . . . 1. *D. spectabilis*  
Racemes compound.

Corolla separating to much below the middle; crests of the inner petals projecting . . . . . 2. *D. eximia*

Corolla not separating to the middle; crests of inner petals not projecting . . . . . 3. *D. formosa*

1. **D. spectabilis**, Lem. (*Dielytra spectabilis*, Don). BLEEDING-HEART. From 1–2 ft. high, the sts. leafy: lvs. broadest in the group, the segms. obovate or cuneate: fls. in simple secund racemes, rosy-red, 1 in. or more long; corolla heart-shaped, with 2 short obtuse spurs; inner petals white, protruding. Japan.—There is a white-fl. var.

2. **D. eximia**, Torr. From 1–2 ft. high, stemless, from a branching scaly root-stock, glabrous and somewhat glaucous: lvs. decomposed, the segms. broadly oblong: scape slender, about equaling lvs.; fls. in compound racemes, rose or pink, less than 1 in. long; corolla tapering from cordate base into a narrow neck, separating to much below the middle, the inner petals with projecting crests. N. Y. to Ga.—There is a var. with more finely cut foliage.

3. **D. formosa**, Walp. Very similar to the above but the rose-purple corolla with a very short neck, the petals united to above the middle, and the crests of the inner petals scarcely surpassing the spreading tips of the outer petals. B. C. to Cent. Calif.

## 66. CAPPARIDACEÆ. CAPER FAMILY

About 35 genera and 450 species of herbs and shrubs, mostly of trop. and subtrop. distribution, a few sometimes grown as ornamentals and one furnishing the capers of commerce.—Sap watery: lvs. alternate, rarely opposite, simple or palmately compound, margins mostly entire: fls. usually bisexual, more or less irregular, in axillary or terminal racemes or solitary; sepals 4–8, free or united; petals 4–8, rarely 0, sessile or clawed; disk ring- or scale-like or sometimes tubular at base of petals; stamens 6 to many, not tetradynamous, inserted on the receptacle; ovary sessile or stipitate, usually 1-celled with 2 parietal placentæ, many-ovuled: fr. a caps. or berry, rarely a drupe, usually (and in ours) on an elongating stipe or gynophore beyond the corolla.

Plant a shrub; fr. a berry . . . . . 1. *CAPPARIS*  
Plant an herb; fr. a caps. . . . . 2. *CLEOME*




1. **CAPPARIS**, L. Shrubs or trees of wide distribution in warm regions, of about 150 species; the flower-buds of *C. spinosa*, when pickled, are the well-known capers.—Lvs. simple, petioled, usually with spiny or bristle-like stipules: fls. white, often bracted; sepals 4; petals 4; stamens many, the filaments filiform and free; ovary long-stalked, the stigma sessile: berry many-seeded, globose or cylindrical, rarely dehiscent. (Cap-paris: ancient classical name of the caper.)

**C. spinosa**, L. **CAPER-BUSH**. A straggling spiny shrub 3 ft. or more high: lvs. roundish or ovate, 1–2 in. long, the petiole short with 2 reflexed spines at base: fls. axillary, solitary on thick peduncles, white; petals about 1 in. long, exceeded by the numerous stamens; gynophore about twice as long as corolla. Medit. region.—There are spineless kinds (vars. *inermis*, *rupestris*).

2. **CLEOME**, L. About 75 species of herbs or subshrubs, mostly in the tropics, particularly of Amer. and Afr., sometimes grown for their odd fls.—Lvs. simple or 3–7-foliolate, the lfts. entire or serrulate: fls. solitary or racemose; sepals 4; petals 4, nearly equal, cruciate, entire; stamens 6, rarely 4; ovary stalked, with a gland at base, style very short or none: caps. linear to oblong, many-seeded. (Cleo-me: derivation uncertain.)

**C. spinosa**, L. (*C. pungens*, Willd. *C. gigantea*, Hort., not L.). **GIANT SPIDER PLANT**. A clammy-pubescent strong-scented annual 3–4 ft. high: lvs. 5–7-foliolate, the lfts. oblong-lanceolate, lower lvs. long-petioled, the floral lvs. or bracts simple, petioles with stipular spines at base: fls. numerous, rose-purple or white, long-pedicelled; petals about 1 in. long, long-clawed; stamens 2–3 in. long, blue or purple: caps. linear, on stipe 2–6 in. long. Trop. Amer.; adventive from N. Y. to La.

## 67. CRUCIFERÆ. MUSTARD FAMILY. CRUCIFERS

A well-marked family characterized in general by 4 petals standing opposite each other in a square cross (whence *Crucifera*, “cross-bearing”), 6 stamens of which 2 are short, and a special kind of pod or silique; mostly herbs, yielding many flower-garden plants and important kitchen-garden vegetables and field crops; genera upwards of 200, and species perhaps 1,800, in many parts of the world, largely in temp. and subarctic regions.—Lvs. exstipulate, alternate (except sometimes opposite in *Lunaria*, *Æthionema*, and few others), usually simple although often deeply pinnatifid, frequently variable in a genus: fls. small but showy because of their numbers, bisexual, regular; sepals 4, mostly soon deciduous; petals 4 (seldom wanting), usually clawed and with a spreading limb; stamens typically 6 and tetradynamous (4 long and 2 short); pistil 1, superior, of 2 united carpels, ripening into a thin-partitioned pod with parietal placentæ at the margin of the partition; when the pod is longer than broad it is called a *siliqua*, when as broad as long a *silicle*; the pod is usually dehiscent by 2 valves, but sometimes indehiscent and breaking crosswise into 1-seeded bodies; seeds small, often globular, filled with the embryo, the cotyledons in characteristic positions (seen by cutting crosswise the seeds, or better by soaking the seeds until they swell),—*accumbent* when the edges stand against the radicle , *incumbent* when they are backed up to the radicle , *conduplicate* when they fold on either side the radicle .—Although *Crucifera* is a “natural” family, the genera are largely artificial or arbitrary and the delimiting of them is often difficult. Fig. 10, A, page 387.

A. Species with fr. plainly dehiscent by 2 valves.

B. Fr. a narrow silique—manifestly longer than broad, the septum or partition usually flatwise of the pod and as broad as the valves.

C. Seeds (and ovules) in a single row or series lengthwise the pod in each compartment.

D. Stigma (in our species) simple or essentially so, and nearly or quite capitate (sometimes obscurely notched but not lobed).



- E. Plant glabrous, or if hirsute or pubescent then of simple hairs.  
 F. Fls. yellow or ochroleucous.  
 g. Length of fl.  $\frac{1}{4}$ in. or more; petals distinctly clawed: cotyledons conduplicate. . . . . 1. BRASSICA  
 gg. Length of fl. usually under  $\frac{1}{4}$ in.; petals not clearly clawed: cotyledons accumbent. . . . . 2. BARBAREA  
 FF. Fls. white or purplish: cotyledons accumbent. . . . . 3. CARDAMINE  
 EE. Plant hirsute or pubescent, many or all of the hairs stellate or forked (when forked seeming to be attached at the middle, particularly if appressed).  
 F. Valves of pod soon falling. . . . . 4. ARABIS  
 FF. Valves remaining on the pod.  
 g. Fls. usually  $\frac{1}{4}$ in. or more in expansion, mostly in dark yellow and brown: cotyledons usually accumbent. . . . . 5. CHEIRANTHUS  
 gg. Fls. usually smaller and lighter yellow: cotyledons incumbent. . . . . 6. ERYSIMUM  
 DD. Stigma plainly 2-lobed, but the lobes sometimes connate to form a long beak and the stigmatic surfaces little exposed.  
 E. Petals entire or essentially so: pubescence of stellate or forking hairs.  
 F. Lobes of stigma shallow, spreading.  
 g. Cotyledons accumbent. . . . . 5. CHEIRANTHUS  
 gg. Cotyledons incumbent. . . . . 6. ERYSIMUM  
 FF. Lobes of stigma more or less spreading or distinct, sometimes thickened on the sides and more or less decurrent. . . . . 7. MATHIOLA  
 FFF. Lobes of stigma erect and parallel, standing face to face. . . . . 8. HESPERIS  
 FFFF. Lobes of stigma connate to form a tapering sharp cone or beak. . . . . 9. MALCOMIA  
 EE. Petals pinnatifid; plant small. . . . . 10. SCHIZOPETALON  
 CC. Seeds (and ovules) in a double row or series in each compartment.  
 D. Plant glabrous or with simple hairs.  
 E. Habit procumbent and rooting. . . . . 11. ROPIPA  
 EE. Habit erect. . . . . 12. ERUCA  
 DD. Plant hairy or pubescent with stellate or forked hairs.  
 E. Stamens with teeth or appendages near base, at least of the 2 short ones. . . . . 13. AUBRIETIA  
 EE. Stamens unappendaged.  
 F. Pod long; seeds more or less winged. . . . . 4. ARABIS  
 FF. Pod very short; seeds not winged or margined. . . . . 14. DRABA  
 BB. Fr. greatly enlarging beyond the seeds, very thin, flat and broad; seeds winged: cult. for the interesting pods as well as fls.  
 c. Pod long-stalked beyond the calyx. . . . . 15. LUNARIA  
 cc. Pod sessile in the calyx. . . . . 16. RICOTIA  
 BBB. Fr. as broad as long (a silicle), not greatly enlarged beyond the seeds, the septum often extending across the short diam.  
 c. Plant a deep-rooted large-leaved perennial, not producing good seeds. . . . . 17. ARMORACIA  
 CC. Plant otherwise, mostly annual, seedful.  
 D. Septum flatwise with the pod, i.e., as broad as the valves.  
 E. Herb, glabrous. . . . . 18. COCHLEARIA  
 EE. Herbs or subshrubby, pubescent with stellate or forked hairs.  
 F. Seeds many in each cell. . . . . 14. DRABA  
 FF. Seeds 1 or 2 in each cell.  
 g. Fls. yellow. . . . . 19. ALYSSUM  
 gg. Fls. white. . . . . 20. LOBULARIA  
 DD. Septum across the short diam., i.e., pod laterally compressed.  
 E. Fls. not showy or prominent; petals very small (or none): grown for salad. . . . . 21. LEPIDIUM  
 EE. Fls. showy: grown for ornament.  
 F. Valves of pod winged or prominently margined.  
 g. Petals equal. . . . . 22. ÆTHIONEMA  
 gg. Petals unequal, 2 much larger. . . . . 23. IBERIS  
 FF. Valves not winged or margined. . . . . 24. IONOPSIDIUM  
 AA. Species with indehiscent fr., the pod often breaking into joints.  
 B. Pod drooping, flat and long. . . . . 25. ISATIS  
 BB. Pod orbicular or obovate, not drooping. . . . . 26. PELTARIA  
 BBB. Pod elongated, cylindrical and beaked, with several seeds. . . . . 27. RAPHANUS  
 BBBB. Pod of 1 fertile 1-seeded hard globular joint: plant often fleshy. . . . . 28. CRAMBE

1. BRASSICA, L. COLES. MUSTARDS. Perennial, biennial, and annual herbs, about 100 species, native in north temp. parts of eastern hemisphere, many of them widely spread as weeds and others affording important food materials.—Sts. erect, branched, glabrous, or with scattered simple hairs, in some of the species very glaucous: fls. yellow or ochroleucous, rarely white, in long simple racemes; sepals erect or spreading, saccate or plane; petals

long-clawed; stigma capitate, sometimes obscurely bidentate: fr. a long slender stalked or nearly sessile pod or silique, tipped with an indehiscent and usually seedless beak; seeds globular, brown-black or yellowish, in a single row, cotyledons conduplicate. (Bras-sica: the classical name.)

- A. The coles: plant glaucous-blue or blue-green (except that hort. vars. may have glaucous-red foliage): lvs. thick, wholly glabrous at maturity: fls. large, nearly  $\frac{1}{2}$  in. and more long, cream-yellow, light-yellow, ochroleucous or white; sepals mostly erect.
  - B. Infl. elongated and open at anthesis, 4-10 in. long; fls. mostly  $\frac{3}{4}$  in. or more long: young radical lvs. glabrous.
    - c. Lvs. large and usually thick, most of those on flowering sts. sessile or clasping: st. not tuberous..... 1. *B. oleracea*
    - cc. Lvs. relatively small (blades mostly 8-10 in. long), on flowering sts. slender-stalked; st. tuberous..... 2. *B. caulorapa*
  - BB. Infl. short in anthesis, with fls. clustered at top, the blooming part usually not more than 2 in. long: fls. shorter: young radical lvs. with scattered hairs.
    - c. Root slender, not tuberous: pedicels strongly ascending: beak of pod slender..... 3. *B. Napus*
    - cc. Root a large tuber: pedicels stout and wide-spreading: beak usually not much exceeding  $\frac{3}{4}$  in..... 4. *B. Napobrassica*
- AA. The turnips and mustards: plant green or only slightly glaucous: lvs. thin, often with scattered hairs: fls. mostly under  $\frac{1}{2}$  in. long, bright yellow; sepals generally spreading.
  - B. Beak of ripe silique conical or slender, not as long as body of pod.
    - c. Silique at maturity wide-spreading.
      - d. Root tuberous, biennial: flowering st. stout and strict, usually not branching near base..... 5. *B. Rapa*
      - DD. Root not tuberous, mostly annual: sts. usually diffusely branching.
        - E. Lvs. lobed, margins notched and angled, those on st. not clasping..... 6. *B. juncea*
        - EE. Lvs. mostly not lobed, and margins not regularly notched or angled.
          - F. Radical and lower lvs. tapering to broad flat winged petiole. 7. *B. pekinensis*
          - FF. Radical lvs. not wing-petioled.
            - G. St.-lvs. clasping..... 8. *B. chinensis*
            - GG. St.-lvs. not clasping..... 9. *B. parachinensis*
      - cc. Silique at maturity closely appressed to rachis..... 10. *B. nigra*
      - BB. Beak of ripe silique flat, equaling or exceeding body..... 11. *B. alba*

1. *B. oleracea*, L. Stout, very glaucous glabrous perennial, perhaps sometimes biennial, on the coasts of W. Eu., not in cult.: radical and lower lvs. thick, fleshy, obovate or oblong, 6-20 in. long; st.-lvs. narrow, some of them clasping: fls. in long racemes, opening for some distance along the axis, often 1 in. long, whitish-yellow; calyx narrow and erect, the sepals more or less saccate: pod 2-4 in. long, with a long conical beak. Following are the main culture-races, mostly biennial:

Var. *acephala*, DC. KALES. BORECOLE. Grown for the foliage which is used for food of man and animals, the plants producing no solid heads or modified parts; some kinds have cut and curled foliage. Here belong the common kitchen kales, collards, tree kales, and cow kales.

Var. *gemmifera*, Zenker. BRUSSELS SPROUTS. St. simple and erect, 2-3 ft., bearing little edible heads or "sprouts" about 1 in. diam. in the axils: lvs. short and broad, about as broad as long; often with ear-like lobes at base.

Var. *capitata*, L. CABBAGE. Low and stout, with short stock, bearing a dense terminal head: lvs. large, often 1 ft. across, oblong-obovate to nearly circular, little if at all lobed at base. In the Savoy cabbage the lvs. are blistered and puckered.

Var. *botrytis*, L. CAULIFLOWER. BROCCOLI. Low, with stout short stock, bearing a dense terminal head, overtopped by lvs., comprised of the transformed and consolidated mass of short thick decolored peduncles and pedicels and undeveloped fls. and bracts: lvs. long-oblong or elliptic, strongly ascending.

Var. *italica*, Plenck. ASPARAGUS or SPROUTING BROCCOLI. Differs from var. *botrytis* in not producing a solid head, but grown for the thickened fl.-shoots that arise from the lf.-axils and also in the crown, making a more or less open and variously aborted panicle.

2. *B. caulorapa*, Pasq. KOHLRABI. Low and stout biennial, with short stock that enlarges just above the ground into a shapely edible tuber 2-4 in. or more diam., bearing lvs. on the top; plant glaucous and glabrous throughout: lvs. thin, relatively small, 8-10 in. long, of which one-third to one-half is slender marginless

petiole, the blades oval to round-oval or oval-oblong with irregularly dentate margins and mostly with 1 or 2 lobes at base: fls. as in *B. oleracea*: beak of pod usually very short. (*Caulorapa*: that is, stem-turnip.) Cultigen.

3. *B. Napus*, L. RAPE. COLZA. Annual, but when sown late blooms following spring, glaucous throughout, mostly with a hard and long tap-root: st. 2-3½ ft., much branching, often purple toward base: lvs. of young plant (seedling) and of unfolding crown bearing few scattered setose hairs, otherwise plant glabrous; basal lvs. 4-12 or more in. long and half or less as broad, lyrate-pinnatifid, the lobes decreasing in size to petiole, terminal lobe very large and obtuse; lower st.-lvs. several-lobed and contracted into narrow part like a winged petiole; upper st.-lvs. oblong-lanceolate, sharply dentate, broad at base and clasping: infl. an elongating raceme, the fls. in anthesis mostly more or less aggregated at the end and not prominently overtopping the buds; fls. light yellow, ¼-¾ in. across, on slender strongly ascending pedicels; sepals not saccate: fr. 2-4 in. long, with slender beak. Known only as a cultigen, and sometimes escaped; *Napus* is an ante-Linnæan name.

4. *B. Napobrassica*, Mill. RUTABAGA. Glaucous biennial, producing a large solid underground tuber bearing roots on its lower half or third and usually gradually tapering downward, flesh mostly yellow but sometimes white, produced above into a lf.-bearing neck or crown: lvs. of seedlings and unfolding crown usually with scattered setose hairs; lvs. like those of *B. Napus* except that those on the st. are prevailingly like the basal ones only smaller: fruiting pedicels stout and strongly divaricate: fr. mostly shorter than in *B. Napus* with a very short beak. Cultigen.—Var. *solidifolia*, Bailey, is a race with unlobed radical lvs.

5. *B. Rapa*, L. TURNIP. Green-leaved biennial, producing an underground mostly flat or globular tuber bearing roots only on the slender tap-root beneath it, usually white-fleshed, and not produced into an extended neck or crown above radical lvs. soft, prickly with few strong setose hairs, lyrate-pinnatifid, long and narrow, 12-20 in. long; st.-lvs. sometimes glaucous, with a clasping base: fls. small, ¾ in. or less long, bright yellow, those in anthesis close together and commonly overtopping the unopened buds: fr. on divaricate-ascending pedicels, about 1½-2½ in. long, with slender beak. (*Rapa* is an old Latin name for turnip.) Cultigen.—Var. *lorifolia*, Bailey, has unlobed mostly shorter radical lvs.—the “strap-leaved” turnips.

6. *B. juncea*, Coss. (*B. rugosa*, Hort. *Sinapis juncea*, L.). LEAF-MUSTARD. Widely variable annual, mostly green but st. sometimes thinly glaucous, glabrous except frequently setose-hispid on young lvs. and sts., erect and much branched, 2-4 ft., seedful: basal lvs. large in the cult. plant and used for greens, oval to broad-oblong to obovate, 6-12 in. long and one-third to one-half as broad, obtuse, prevailingly lyrate-lobed or -divided, margins notched or scalloped: fls. bright yellow, ¾ in. or less long, scattered in the raceme or more typically aggregate at end and overtopping the unopened buds: fr. 1½-2½ in. long, strongly ascending or erect, beak short and stout. Asia; much cult. for spring greens as Chinese mustard and under other names; also spontaneous in forms with less-developed basal lvs.—Var. *crispifolia*, Bailey (*B. japonica*, Hort., not Thunb.), has lvs. cut, curled, and crisped, represented in Southern Curled Mustard and others.

7. *B. pekinensis*, Rupr. (*B. Pe-Tsai*, Bailey). PE-TSAL. Green soft-leaved annual, grown mostly as a late autumn and winter vegetable, glabrous except sometimes sparsely setose-hairy on midribs beneath: basal lvs. many and large, 1-2 ft. long and less than half as broad, obovate-oblong to broad-obovate, thin and veiny, margins undulate but only indistinctly dentate, the midrib broad and light colored and extending downward as a broad jagged-winged base of the blade; st.-lvs. either clasping or petiolate or both on same plant: fls. light yellow, mostly less than ¾ in. long, commonly crowded at end of raceme and overtopping unopened buds: fr. rather short and stout, 1¼-2½ in. long, spreading or ascending, the beak short and stout. Probably farther Asia: now considerably grown as “Chinese” or “celery cabbage,” forming more or less compact elongated heads the inside of which is blanched.

8. *B. chinensis*, L. PAK-CHOI. Dull green annual or biennial, more or less glaucous when in bloom, glabrous throughout: basal lvs. firm and shining, spreading and not forming a compact head, 10-20 in. long, obovate or very broad-obovate, entire or only obscurely crenate or sinuate-dentate, narrowed gradually into a distinct narrow-margined but not jagged petiole; st.-lvs. auriculate-clasping: fls. pale yellow, about ¾ in. long, aggregated at top of raceme and overtopping the unopened buds: fr. 1¼-2½ in. long, slender, beak slender. Probably farther Asia; infrequently grown as pot-herb.

9. *B. parachinensis*, Bailey. FALSE PAK-CHOI. Differs from No. 8 chiefly in more orbicular basal lvs. without margined petioles, and st.-lvs. not clasping. Probably farther Asia; little known in this country.

10. *B. nigra*, Koch (*Sinapis nigra*, L.). BLACK MUSTARD. Much-branched green annual, st. usually more or less hispid-hairy but sometimes glabrous, in some cases slightly glaucous, 3-10 ft. and even more tall: lvs. various, often hispid, the radical ones not greatly developed, pinnatifid or lobed, terminal lobe very large, margins dentate or notched, long-petioled as also are the st.-lvs.: fls. small, about  $\frac{1}{4}$  in. long, bright yellow, in twig-like racemes, usually not overtopping central unopened buds: fr. short, less than 1 in. long, 4-sided, abruptly contracted into a thin beak, on short pedicels and closely appressed to the rachis. Eurasian, now a wide-spread weed; principal source of table mustard, and mentioned also as a pot-herb plant.

11. *B. alba*, Rabenh. (*Sinapis alba*, L.). WHITE MUSTARD. Stout annual, mostly sparsely hairy, branching above, 2-4 ft. tall: lvs. oval or ovate or obovate in outline, divided deeply or even quite to the midrib into 1-3 pairs of notched or angled lobes, st.-lvs. long-petioled: fls. yellow, about  $\frac{1}{2}$  in. long, aggregated at apex of raceme and overtopping the unopened buds: fr.  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, squarrose, lower part setose and seed-bearing with constrictions between the seeds, equalled or exceeded by the flat mostly scythe-curved beak; seeds commonly light yellow, large. Eurasian; cult. for seeds and for the lvs.; also spontaneous.

2. **BARBAREA**, R. Br. (*Campe*, Dulac) WINTER-CRESS. Biennials, perhaps perennial, of about a half-dozen species in temp. regions: erect glabrous branching herbs, sometimes grown for greens, with angled sts.: lvs. pinnatifid or lyrate: fls. small, light or greenish-yellow, in elongating racemes; stigma nearly entire, capitate: fr. long, linear, 4-sided or -angled, erect or spreading, valves keeled; seeds in 1 row, accumbent. (Barbare-a: anciently dedicated to St. Barbara.)

Pod about 1 in. or less long, on slender pedicel. . . . . 1. *B. vulgaris*  
Pod 1 $\frac{1}{2}$  in. or more long, on pedicel nearly or quite as thick as itself. . . . . 2. *B. verna*

1. *B. vulgaris*, R. Br. Biennial or perennial 1-2 ft. high, blooming in spring from over-winter rosettes: lvs. pinnatifid with mostly 1-3 pairs of lobes and a large rounded terminal lobe, petioled, the upper ones on the st. sessile, clasping and only angled: pods spreading, about  $\frac{3}{4}$ -1 in. long, the short pedicels distinctly thinner than themselves. Eu., but widely naturalized in N. Amer.; it has been offered as a salad plant under the name Upland Cress; an ornamental variegated-leaved var. is known; also double-fl.

2. *B. verna*, Aschers. (*B. præcox*, R. Br.). Similar, but lobes of lvs. 4 or more pairs: pods longer, on pedicels of nearly equal thickness. Eu., naturalized; sometimes grown as a cress.

3. **CARDAMINE**, L. BITTER-CRESS. Species probably more than 100, annual and perennial, of small size, one cult. for ornament, native in temp. regions, mostly in swamps and along streams.—Erect or ascending from tubers or scaly rhizomes, mostly glabrous, lf.-bearing: lvs. simple, pinnate or lyrate: fls. white or purple, often showy for size of plant, mostly racemose; stigma simple: siliques linear and somewhat flattened, valves nerveless or nearly so and separating elastically from base; seeds in 1 row, wingless, accumbent. (Cardam-ine: ancient name of a cress.)

*C. pratensis*, L. CUCKOO-FLOWER. Slender erect glabrous perennial 12-20 in. high, with attractive fls. in spring and early summer: lvs. pinnately divided, the pairs 3-7, segms. small, oblong or rounded, usually not exceeding  $\frac{1}{2}$  in. long: fls. white or rose-purple, bright,  $\frac{1}{2}$  in. long, in a terminal erect corymb-like raceme, sometimes double. Eu. and Amer., native in the northern parts.

4. **ARABIS**, L. ROCK-CRESS. One hundred and more species of small annuals, biennials and perennials in temp. regions, very few grown in borders and rock-gardens.—Erect or spreading, mostly more or less hairy or pubescent with stellate or forked hairs: lvs. entire, lobed or pinnatifid: fls. white or purple, in terminal racemes or spikes, usually small but often profuse and appearing over a considerable period; stigma nearly or quite entire: fr. linear, flattened,



the valves commonly 1-nerved; seeds in 1 row or 2 rows, usually winged, cotyledons accumbent. (Ar-abis: Arabia.)

Plant felty-pubescent: lvs. notched on upper part.....1. *A. albida*  
Plant lightly hairy or pubescent: lvs. mostly notched to base.....2. *A. alpina*

1. *A. albida*, Stev. Low tufted perennial with horizontal woody stock, sts. ascending 4-10 in., plant whitish, soft-pubescent with mostly stellate hairs: lvs. spatulate, coarsely toothed usually only on the broad part, those on the sts. oblong to lanceolate and auriculate-clasping: fls.  $\frac{3}{8}$ - $\frac{1}{2}$  in. long, white, pedicelled in a loose raceme, in spring, fragrant: fr. about  $1\frac{1}{2}$  in. long at maturity, seeds in 2 rows. Caucasus.—Races with double fls. and variegated lvs.

2. *A. alpina*, L. Less pubescent, mostly with forked hairs, of much the stature of No. 1, sts. perhaps more erect and floriferous: lvs. mostly oblong, rather sharp-toothed to base: fls. somewhat smaller, pure white: fr. rather more slender, seeds in 1 row. Mts. of Eu.; grown in rockeries in several vars., as dwarf, double-fl'd., lvs. variegated.

5. **CHEIRANTHUS**, L. A dozen to a score of perennials, sometimes sub-shrubby, from the Madeira and Canary Isls. eastward to the Himalayas; one well-known in flower-gardens.—Plant with appressed forked hairs: lvs. narrow, entire or nearly so: fls. prevailing yellow and orange, often tinted brown or in cult. brown-purple; in terminal racemes or spikes; lateral sepals saccate at base; petals long-clawed; stigmas mostly with 2 short spreading lobes: fr. long, 4-sided or -angled; seeds in 1 row, not winged, cotyledons accumbent. (*Chei-ri* is said to be a modification of an Arabic name for a plant; here combined with the Greek *anthos*, flower.)—The application of this name and *Mathiola* is open to question.

**C. Cheiri**, L. WALLFLOWER. Hardy perennial, erect,  $1-2\frac{1}{2}$  ft., thinly appressed-pubescent, with a grayish cast: lvs. lanceolate to narrow-lanceolate, acute,  $1\frac{1}{2}$ -3 in. long, often bunched beneath the fls. and at the end of sterile shoots: fls. large,  $\frac{3}{4}$ -1 in. long, very fragrant, yellow or yellow-brown, in early spring; petals rounded, slender-clawed, much exceeding the calyx: fr.  $2-2\frac{1}{2}$  in. long and rather thick, angled, with short style-tip. S. Eu.; an old garden favorite in many forms and colors, often much doubled.—**C. Allionii**, Hort., said to be a hybrid, has brilliant orange fls. profusely produced in spring and summer; plant 12-18 in. high; lvs. more scattered.

6. **ERYSIMUM**, L. BLISTER-CRESS. Annuals, biennials, and perennials differing technically from *Cheiranthus* in the incumbent rather than accumbent cotyledons; these characters are not constant, however, and the two genera should be merged, particularly as the species overlap geographically in the Old World; the American species of *Erysimum* have been named in *Cheiranthus* by certain authors, but this disposition is not generally accepted. The *Erysimums* usually have more angular siliques than *Cheiranthus*. It is probable that the two genera are represented in cult. by hybrids. Some 90-100 species of *Erysimum* are recognized. Other authors apply the name *Erysimum* to the common hedge mustard (commonly known as *Sisymbrium officinale*) and the species of *Erysimum* then take the name *Cheirinia*. (*Erys-imum*: Greek name meaning to draw blisters.)

**E. Perofskianum**, Fisch. & Mey. Annual or plur-annual, erect, lightly grayish-pubescent, 1-2 ft., the sts. simple or nearly so: lvs. lanceolate to linear-lanceolate, 2-3 in. long, acute, tapering into a petiole, entire or remotely toothed: fls. yellow or orange,  $\frac{3}{4}$ -1 in. long, in lengthening terminal racemes, aggregated at the top in anthesis: fr. 2-3 in. long, ascending on short pedicels, more or less 4-sided, usually with a slender part of beak beneath the capitate obscurely bidentate stigma. (Bears the name of Velar de Perowski.) Caucasus, Afghanistan.—Some of the cult. *erysimums* may be **E. asperum**, DC. (*E. arkansanum*, Nutt.), of E. N. Amer., biennial or perennial, yellow-fl'd., with pod not beaked beneath the conspicuous stigma; some of the dwarf and very leafy short-podded kinds may be *E. nanum*, Boiss. & Hohen., of Persia.

7. **MATHIOLA**, R. Br. Annual and perennial herbs, sometimes subshrubs, 50 or more species of the Old World, one in common cult. in flower-gardens and by florists.—Gray-pubescent plants, differing from *Cheiranthus* in the purple and white (not true yellow) fls., stellate hairs, pod terete or compressed, stigmas manifestly 2-lobed and the lobes either spreading or thickened on the sides and decurrent down the style, and in the broad winged or margined seeds. (Mathi-ola, usually but not originally spelled Matthiola; Peter Andrew Matthioli was an Italian physician and botanist, 1500–1577.)

Pod terminating in 2 long horns; plant diffuse. .... 1. *M. bicornis*  
Pod not horned; plant very erect. .... 2. *M. incana*

1. **M. bicornis**, DC. EVENING STOCK. Diffuse much-branched annual or biennial, with long slender parts: lvs. linear-lanceolate to lanceolate,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. long including the short petiole, acute, entire or remotely small-toothed: fls. solitary and sessile at intervals toward the end of the sts., about  $\frac{3}{4}$  in. long, broadly expanding at evening and closed by day, very fragrant when open, lilac or purplish: fr. 3–4 in. long, spreading and looking like branches, forked at the end. Greece to S. W. Asia.

2. **M. incana**, R. Br. STOCK. GILLIFLOWER. Erect biennial or perennial, felty-pubescent, sts. stiff, 1–2 ft. high, more or less woody at base: lvs. long-oblong to oblanceolate,  $2\frac{1}{2}$ –4 in. long including the narrow petiole-like base, very obtuse, entire: fls. in terminal racemes, on stout pedicels, about 1 in. long but becoming much broader in the double forms, purple or reddish but cult. in white, pink, scarlet, terra-cotta, and yellowish: fr.  $1\frac{1}{2}$ –3 in. long, erect, thick and stout, suddenly terminated by the remains of the 2-lobed stigma. S. Eu.; extensively cult. in many forms.—Var. *annua*, Voss (*M. annua*, Sweet), TEN WEEKS OR INTERMEDIATE STOCK, is annual, less woody, blooming earlier from seed.

8. **HESPERIS**, L. ROCKET. About two dozen species in the Medit. region and Cent. Asia, biennial or perennial, one known in cult. for its bloom.—Erect, glabrous, or with simple and forked hairs: lvs. mostly undivided, entire or toothed: fls. white or purple and showy in long terminal racemes, often fragrant; lobes of stigma erect and face to face: fr. long and linear, spreading, more or less torulose, remains of the 2-lobed stigma usually apparent; seeds in 1 row, wingless, cotyledons incumbent. (Hesperis: Greek *evening*, when the fragrance is most marked.)

H. **matronalis**, L. DAMES-VIOLET. Tall branching biennial or perennial, 2–3 ft., hirsute or sometimes glabrous: lvs. lanceolate to lance-ovate, 2–4 in. long, sharp-acuminate, sessile or with short base, denticulate: fls. about  $\frac{3}{4}$  in. long, in terminal racemes, lilac or light purple (white races and also double-fl. ones): pods 3–4 in. long, very slender, the mature stigmas forming a sharp beak. Eu. and Asia; also naturalized, and frequent about old yards, blooming in spring and early summer.

9. **MALCOMIA**, R. Br. Species about 30, in the Old World, chiefly in the Medit. region; one is grown in the flower-garden.—Annuals, differing from *Hesperis* technically in the 2 stigmas that are connate and form a tapering sharp-pointed cone-like beak: plants much branching, often more or less prostrate, the pubescence of forked hairs or stellate: lvs. entire or pinnatifid: fls. white, reddish or purplish, in terminal racemes; petals either long-clawed or long and narrow: fr. long and linear; seeds in 1 row (or side by side sometimes at base of pod), not winged or margined, the cotyledons incumbent. (Malcomia, sometimes spelled Malcolmia; Wm. Malcolm was an English nurseryman, about 1778–1805.)

M. **maritima**, R. Br. VIRGINIAN STOCK. Diffuse little annual 8–15 in. high, the sts. erect or sometimes the main st. decumbent and erect branches rising from it, lightly pubescent with appressed forked hairs: lf.-blades 1– $1\frac{1}{2}$  in. long, oblong, elliptic, or linear-oblong, obtuse, entire, the lower ones narrowed into a petiole: fls. small, about  $\frac{1}{2}$  in. long, bright, lilac, red, white, borne in profusion and pro-

duced in long succession by means of repeated sowings; pedicels slender, mostly shorter than the calyx: fr. very slender, about 2 in. long, sharp-pointed. Coasts of S. Eu.

10. **SCHIZOPETALON**, Sims. About 10 to 12 S. American annuals, one of which is an attractive little flower-garden subject.—Erect, somewhat branched, low, with sinuate, toothed or pinnatifid lvs., the pubescence of branching hairs: fls. white or purple, in terminal bracted racemes; petals long-clawed, with unequally cut or pinnatifid limb (whence the generic name, *Schizopetalon*, *cut-petals*): fr. narrow-linear, more or less flattened and torulose; seeds in 1 row, not winged or margined, cotyledons incumbent.

**S. Walkeri**, Sims. St. weak, ascending, about 9 in. high: lvs. long-oblong, the lower ones 4–5 in. long, sinuate-pinnatifid, attenuate at base, scabrous on both surfaces: fls. axillary and solitary but forming a loose raceme, white, fragrant, closing in forenoon and opening again toward night,  $\frac{1}{2}$  in. or more across; petals ovate, pinnatifid, giving the bloom a feathery effect. (Seeds long ago received in England from Chile by John Walker, who grew it.)

11. **RORIPA**, Scop. Species probably more than 50, but the generic limitations are not agreed on, mostly in wet and moist places in the temp. zone; one is everywhere known as a salad plant.—Mostly small glabrous plants, known sometimes under the name *Radicula* and formerly as *Nasturtium*, annual, biennial, and perennial: lvs., some or all, variously pinnatifid or pinnate or sometimes entire: fls. small, white or yellow, in terminal racemes; stamens sometimes less than 6: fr. short, terete or nearly so, the valves convex and nerveless; seeds in 2 rows in most species, many and small, marginless, the cotyledons accumbent. (*Ror-ipa*: name unexplained.)

**R. Nasturtium-aquaticum**, Hayek. **WATER-CRESS**. Perennial, creeping or floating, rooting, thriving in clear cold water: lvs. odd-pinnate, with 1–4 pairs of small oblong or roundish lfts., the terminal lft. larger: fls. small, white, in elongating racemes, pedicelled: fr. a curved linear long-pedicelled somewhat turgid many-seeded silique with a short beak-like tip. Wide-spread in ditches and streams and often colonized for the supply of cress; naturalized from Eu.—The plant has many names, as *Sisymbrium Nasturtium-aquaticum*, L., *Nasturtium officinale*, R. Br., *Radicula Nasturtium-aquaticum*, Britt. & Rendle.

12. **ERUCA**, Mill. A few species of erect annual and biennial herbs of Eu. and W. Asia, one sometimes grown for salad.—Lvs strongly dentate or pinnatifid: fls. large, whitish, yellow, purplish, in elongating terminal racemes, the style prominent, stigma undivided: fr. oblong to linear-oblong, turgid with strongly keeled valves; seeds globose, not winged, in 2 rows, cotyledons conduplicate. (*Eru-ca*: ancient name for some cruciferous plant.)

**E. sativa**, Mill. **ROCKET-SALAD**. **ROQUETTE**. Annual, erect, much branching, 1–2½ ft., with scattered simple hairs: lvs. irregularly pinnately lobed, the margins angled and notched: fls.  $\frac{3}{4}$ –1 in. long, on short pedicels, whitish or cream-yellow with darker veins: fr. about 1 in. long, erect and appressed, with a prominent flat beak. S. Eu., sparingly adventive; infrequently grown in this country for spring and autumn piquant salad.

13. **AUBRIETIA**, Adans. A dozen little perennials in the Medit. region, one frequent in rock-gardens and borders.—Cespitose or mat-forming plants of mts., pubescent with stellate or forked hairs: lvs. entire or angularly toothed: fls. few but large for size of plant, in short terminal racemes, violet or purple; outer sepals saccate; shorter filaments toothed; style slender and stigma simple: fr. short, in some species globose but in ours oblong; seeds in 2 rows, the cotyledons accumbent. (*Aubrie-tia*: Claude Aubriet, French flower and animal painter, died 1743.)

**A. deltoidea**, DC. Attractive spring and summer bloomer, 2–12 in. high, spreading, the pubescence (at least in part) stellate: lvs. spatulate, long-deltoid or

rhomboidal, narrowed to short petiole, with 1 or 2 teeth on either side: fls. few but bright-colored, pedicelled, the violet or purple petals long-clawed: fr.  $\frac{1}{2}$ –1 in. long, of which half is the slender style-beak, pubescent, the body oblong or sometimes nearly half as broad as long. Italy, Greece.—There are many forms of it, often listed under specific names, as: Var. *Leichtlini*, Nichols., a pink-fl'd. profuse bloomer; var. *græca*, Nichols., large-fl'd., dwarf and compact; var. *olympica*, Nichols., large-fl'd., violet; var. *Campbelli*, Nichols., plant large, fls. large, purple; var. *purpurea*, Nichols., lvs. broader and more toothed, plant more erect, fls. large, purple.

14. **DRABA**, L. Little tufted annuals and perennials, largely of mts. and cold regions, somewhat grown in rock-gardens for spring bloom; species probably 175, mostly in the northern hemisphere.—Stellate-hairy or -pubescent: lvs. simple, entire or dentate, mostly in basal rosettes: fls. small but usually profusely produced, in few-fl'd. racemes, white, yellow or purplish; filaments not toothed; stigma nearly or quite entire: fr. short, linear to nearly globose, glabrous or pubescent; seeds in 2 rows, not margined, the cotyledons accumbent. (Dra-ba: old Greek name for a cress.)

Fls. deep yellow; pods hairy.....1. *D. olympica*  
Fls. whitish; pods glabrous.....2. *D. fladnizensis*

1. **D. olympica**, Sibth. Densely caespitose perennial: lvs. narrow-linear, keeled, prominently ciliate, much crowded: fls. golden-yellow, in a very short raceme on scapes 2–4 in. tall, the petals twice as long as calyx: fr. little longer than broad, hairy, with short style-beak. Greece and eastward.

2. **D. fladnizensis**, Wulf. (*D. androsacea*, Wahl.). Tufted perennial: lvs. oblanceolate, entire and nearly acute, ciliate or nearly glabrous: fls. whitish or yellowish-white, in short racemes on scapes 2–3 in. tall: fr. oblong, glabrous, the style-beak not evident. Arctic and alpine regions, Asia, Eu., N. Amer.

15. **LUNARIA**, L. MOONWORT. Two herbs of Eu. and Asia, grown for ornament; annual-biennial, perennial.—Erect, branched, with sparse or scattered simple hairs: lvs. ovate-deltoid or ovate, simple, dentate, petioled, some of them opposite: fls. violet or purple (varying to white), in terminal racemes; lateral sepals saccate; petals prominent and long-clawed; stigmas minute, connate into a point: fr. greatly enlarging flatwise, stipitate in the calyx, the valves falling away at maturity and leaving the papery shiny septum; seeds few, flat and winged, cotyledons accumbent. (Luna-ria: *luna*, the moon, which the lustrous septum suggests.)

Pod nearly as broad as long, rounded or truncate at either end.....1. *L. annua*  
Pod twice or more longer than broad, tapering at either end.....2. *L. rediviva*

1. **L. annua**, L. (*L. biennis*, Moench). HONESTY. Annual or biennial,  $1\frac{1}{2}$ –3 ft. high: lvs. coarsely and scarcely acutely toothed: fls.  $\frac{3}{4}$ –1 in. long and broad, mostly pink-purple, fragrant: fr. very thin and flat,  $1\frac{1}{2}$  in. or more long, slightly oblong, the style-beak slender and  $\frac{1}{4}$ – $\frac{3}{4}$  in. long; seeds nearly orbicular.—Grown for the fls., but chiefly for the thin lustrous septa that are held in the pod-margins, like spectacles in their rims, after the valves fall and persisting through the winter; often used in dry bouquets; plant also escaped.

2. **L. rediviva**, L. Perennial: lvs. finely and sharply toothed: pod oblong-lanceolate, unequal-sided, 2–3 in. long and about 1 in. broad, tapering at both ends, style mostly shorter; seeds reniform.—Less grown than the last, the pods little ornamental; perhaps escaped.

16. **RICOTIA**, L. About a half-dozen annuals of the E. Medit. region, one infrequently grown in the flower-garden for its bloom.—Weak herbs, glabrous, generally diffusely branching: lvs. more or less pinnatisect: fls. lilac, in terminal racemes; lateral sepals saccate at base; petals prominent, clawed; stigma entire: fr. a broad flat thin silique, not stipitate in calyx; seeds in 1 row, sometimes the compartment 1-seeded, flat, cotyledons accumbent. (Rico-tia: bears the name of Ricot, a little-known French botanist.)

**R. Lunaria**, DC. Very diffuse annual, coming into bloom rapidly, in May and June, the long-petioled obcordate large cotyledons usually persisting: lvs. pinnati-



sect, with 2 or 3 nearly opposite lobed lfts.: fls.  $\frac{1}{2}$  in. or more across: fr. oblong, about 1 in. long, somewhat tapering either way, tipped with short style-beak, hanging. Syria, Egypt.

17. **ARMORACIA**, Gaertn. A few perennial herbs in Eu. and Asia, the group not yet clearly defined; one is cult. for eating.—Roots deep and large: lvs. mostly dock-like, notched or some of them fimbriate, glabrous: fls. white, small but many in paniced racemes, on slender pedicels; stigma capitate; ovules in 2 rows: fr. nearly orbicular, small; cotyledons accumbent. (*Armoracia*: an old Latin substantive designating the horse-radish.)

**A. rusticana**, Gaertn., Mey. & Scherb. **HORSE-RADISH**. Strong long-lived perennial with deep branching woody root used as a sauce and relish: lower lvs. large, oblong or oblong-ovate, long-petioled, crenate-dentate, some of the early ones much-lobed or even pectinate; st.-lvs. mostly sessile or tapering: fl.-st.  $1\frac{1}{2}$ –3 ft., bearing many white fls., in spring,  $\frac{1}{2}$  in. or more across: fr. ovoid to short-oblong, sometimes not forming and apparently not maturing viable seed. S. E. Eu., also run wild.—The plant is named in several genera, as *Cochlearia Armoracia*, L., *Nasturtium Armoracia*, Fries, *Roripa Armoracia*, Hitchc., *Radicula Armoracia*, Rob.

18. **COCHLEARIA**, L. Something like 20 annual, biennial, and perhaps perennial herbs, one sometimes cult. for eating.—Mostly seaside more or less fleshy glabrous plants: lvs. simple, usually entire: fls. small, white, yellow, or purplish, in terminal racemes; stigma mostly capitate: fr. a small silicle, globose or very short-oblong, somewhat inflated but not bladdery, the valves very convex; seeds wingless, usually in 2 rows, cotyledons prevalingly accumbent. (*Cochlearia*: Greek *spoon*, alluding to the shape of lvs.)

**C. officinalis**, L. **SCURVY-GRASS**. Small biennial or perennial but grown as an annual, 2–12 in. high, much-branched and diffuse, making many long-petioled, oblong, reniform or cordate root-lvs.: fls. in spring, small, white,  $\frac{1}{4}$  in. or less broad, slender-pedicelled in a close cluster that becomes an elongating raceme: fr.  $\frac{1}{4}$  in. or less long. Northern boreal and arctic regions; formerly grown somewhat as a salad plant (with a tarry flavor), but the plant known mostly medicinally as an antiscorbutic.

19. **ALYSSUM**, L. **MADWORT**. Mostly in the Medit. region, annual and perennial herbs and subshrubs, probably more than 100 species, very few grown as rock-garden and border subjects.—Low, branching, stellate-pubescent, often cespitose: lvs. small, undivided, entire or toothed: fls. yellow, small, in lengthening terminal racemes; petals entire or retuse; filaments toothed or appendaged: fr. a small silicle with septum flatwise, orbicular or short-oblong, with nerveless valves; seeds 1 or 2 in each compartment, wingless, the cotyledons accumbent. (*Alyssum*: the classical name, from Greek for *madness*; supposed to stop hydrophobia.)

**A. saxatile**, L. **GOLDEN-TUFT**. Profusely spring-flowering perennial, with grayish herbage, the sts. erect, 8–12 in.: radical lvs. many, oblanceolate, 3–4 in. long, much tapering at base, short-acute or obtuse, entire or obscurely dentate: fls. golden-yellow, in compact paniced clusters that become elongated racemes: fr. nearly circular, glabrous, tipped with prominent style. S. Eu.; cult. in several forms, as dwarf, variegated-leaved, and double-fl'd.—*A. rostratum* is listed as a summer-blooming yellow-fl'd. perennial, but the plant of botanists by that name (*A. rostratum*, Stev.) is annual.

20. **LOBULARIA**, Desv. (*Koniga*, R. Br.). About 4 Medit. species, differing from *Alyssum* in having forked and simple rather than stellate hairs, white entire petals, filaments not toothed but with 2 glands at base. (*Lobularia*: Latin *lobulus*, a little lobe, probably in reference to the forked hairs.)

**L. maritima**, Desv. (*Alyssum maritimum*, Lam.). **SWEET ALYSSUM**. Familiar little white-fl'd. fragrant perennial but everywhere grown as an annual, wide-spreading on the ground, branches rising 6–12 in.: lvs. lanceolate or linear, entire, tapering

to base: fls. small but numerous, in lengthening racemes, slender-pedicelled: fr. small, nearly circular, tipped with short but evident beak. Sometimes escaped; cult. in large and small forms and with white-edged lvs.; blooms over a long season.

**21. LEPIDIUM, L. PEPPERGRASS.** Species probably 100, widely distributed, one grown for salad.—Annuals, perennials, and subshrubs, erect or spreading, glabrous or pubescent with simple hairs, not showy or attractive: lvs. various, simple or pinnate: fls. small and inconspicuous, the petals white or nearly so but sometimes wanting; stamens often only 2-4: fr. an orbicular, oblong, or obovate silicle, with septum or partition across the short diam., valves boat-shaped; seeds 1 or rarely 2 in each compartment, not winged, the cotyledons mostly incumbent. (Lepid-ium: Greek *little scale*, from the pods.)

**L. sativum, L. GARDEN CRESS.** Annual, 1-2 ft., erect, glabrous and glaucous: basal lvs. (for which the plant is grown) pinnatifid and the segms. toothed, or in the common curled vars. more finely divided and crispate; st.-lvs. becoming successively simple, linear and entire in the upper infl.: fls. very small, in elongating racemes, but the oblong-oval winged retuse frs. conspicuous. W. Asia; somewhat escaped.

**22. ÆTHIONEMA, R. Br.** Herbs and subshrubs in the Medit. region, probably 50 species, a few of which, as perennials, are grown in rock-gardens and borders for ornament.—Slender branched plants, mostly glabrous, more or less woody at base: lvs. sessile, glaucous, sometimes opposite, commonly entire: fls. white or rose-colored or seldom yellowish, in elongating terminal racemes, often rather showy; 4 longer filaments toothed or sometimes connate; petals all equal: fr. orbicular, boat-shaped or obovate, usually notched at top, winged, the septum or partition across the short diam.; seeds few to many, not winged, cotyledons incumbent. (Æthione-ma: Greek compound, probably alluding to appearance of stamens.)

Silicle orbicular, the wing twice or more broader than compartment:

plant 1 ft. or more high.....1. *Æ. grandiflorum*

Silicle obovate-oblong, wing narrower: plant 4-10 in.....2. *Æ. coridifolium*

1. **Æ. grandiflorum, Boiss. & Hohen.** Erect, 12-18 in., the branches long and slender: lvs. long oblong-linear, nearly or quite obtuse: fls. large, rose-colored, in slender elongated racemes, the petals four times as long as calyx; longer filaments dilated at base: fr. orbicular, with wing more than double width of compartments. Caucasus.

2. **Æ. coridifolium, DC.** Lower, 4-10 in., sts. thickish: lvs. crowded, shortly oblong-linear to linear, obtuse or acutish: fls. smaller than in No. 1 and later, rosy-lilac, in short dense racemes: fr. obovate-oblong, notched at base and apex, wing narrow. Lebanon and Taurus.

**23. IBERIS, L. CANDYTUFT.** Species 30-40, annual and perennial, often more or less woody, in the Medit. region, affording popular flower-garden subjects.—Branching mostly glabrous plants, with entire or pinnatifid sometimes fleshy lvs.: fls. white or purplish, in corymbs or lengthening racemes, the outer ones in the cluster mostly radiate; 2 outer petals in the fl. larger than the others; filaments not appendaged or connate: fr. an orbicular or ovate winged or margined pod often notched at top, the septum across the short diam.; seed 1 in each compartment, ovate, not winged on margins, cotyledons accumbent. (Ibe-ris: Iberia, ancient name of Spain.)

The annual flower-bed candytufts.

Infl. lengthening in fr., so that it becomes a distinct raceme; fls. white. 1. *I. amara*

Infl. not lengthening, so that it remains at least as broad as high;

fls. mostly colored.....2. *I. umbellata*

The perennial or border candytufts, with evergreen foliage.

Infl. remaining at least as broad as high.....3. *I. gibraltarica*

Infl. separating and lengthening in fr.....4. *I. sempervirens*

1. **I. amara, L. (*I. coronaria*, Hort.). ROCKET CANDYTUFT.** Annual, erect, or lopping and with erect sts., 6-12 in.: lvs. oblanceolate to spatulate, 2-3 in. long,

obtuse, mostly with few or several large irregular obtuse teeth: fls. white, in a close nearly globular terminal cluster that soon elongates until, in fr., it is 2-6 in. long: fr. nearly orbicular or slightly tapering at the winged emarginate top, the style evident or projecting, points of the pod short and erect. Eu., a weed of cult. grounds; common in flower-gardens.

2. *I. umbellata*, L. Often taller: lvs. lanceolate, mostly longer, acute, entire, or sometimes with very few small short teeth: fls. rose-colored, shades of red, or purple (varying to nearly white), in clusters that remain, in fr., as broad as high: fr. obovate, with a deep wide sinus at top, very slender style, and apiculate spreading points. Spain to Italy; in many color vars. in cult.

3. *I. gibraltarica*, L. Perennial, evergreen, spreading, glabrous, 1 ft.: lower lvs. oblong-spatulate,  $1\frac{1}{2}$ -2 in. long and  $\frac{1}{2}$   $\frac{5}{8}$  in. broad, with 3 or 4 distinct teeth on either side toward top: fls. white or reddish-lilac, in terminal clusters 2-3 in. across that do not elongate in fr.; ray petals on the outer rows in the cluster about  $\frac{3}{4}$  in. long and  $\frac{1}{4}$  in. broad: fr. nearly orbicular, large, nearly  $\frac{1}{2}$  in. across either way, with open sinus at apex from which the style slightly projects. Spain, Morocco.

4. *I. sempervirens*, L. Perennial evergreen, branching and somewhat woody at base, glabrous except perhaps on pedicels, 6-10 in.: lvs. small and entire,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, those on barren shoots linear and about  $\frac{1}{6}$  in. broad, those on flowering sts.  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad: fls. white, in heads about 1 in. long that lengthen and become racemose in fr.; ray petals of outer rows about  $\frac{1}{2}$  in. long and  $\frac{1}{4}$  in. broad: fr. smaller than in No. 3, the sinus less deep.

24. *IONOPSIDIUM*, Reichb. One little annual in Portugal, grown sometimes for its bloom.—Glabrous: fls. violet (varying to white), on very long and slender pedicels, small but profusely produced and bright-colored; filaments free and not toothed or appendaged: fr. globular-oblong, truncate or slightly emarginate at apex, the septum extending across the short diam., the valves not winged; seeds 2-5 in each compartment, slightly oblong, not winged or margined, minutely granular, the cotyledons incumbent. (*Ionopsidium*: Greek *violet-like*, from the color of the fls.)

*I. acaule*, Reichb. Nearly acaulescent, making runners, 3-4 in. high: lf.-blades nearly orbicular, entire, mostly less than  $\frac{1}{2}$  in. across, abruptly narrowed into very long petiole: fls. very small, about  $\frac{3}{8}$  in. across, fragrant, the rounded petals twice exceeding the calyx; in moist shady places it blooms summer to winter.

25. *ISATIS*, L. WOAD. Some 50 species of annuals, biennials, and perennials of the Medit. region, one or two somewhat known in cult.—Erect branching herbs, glabrous or pubescent or even tomentose: lvs. undivided, those on the st. usually auriculate-clasping: fls. small, yellow, in open often paniced bractless racemes; stamens free, without teeth or appendages: fr. samara-like, 1-celled, indehiscent, flat, pendulous, either narrow or more or less expanded and winged; seed 1, hanging from top of compartment, cotyledons usually incumbent. (*I-satis*: classical name for a healing herb.)

Upper st.-lvs. with narrow auricles.....1. *I. tinctoria*  
Upper lvs. without auricles.....2. *I. glauca*

1. *I. tinctoria*, L. DYERS WOAD. A plant once cult. for its blue dye and likely still to be found: biennial,  $1\frac{1}{2}$ -3 ft., glabrous or somewhat hairy below: radical lvs. oblong or obovate, entire or toothed, glabrous and glaucous or hairy; st.-lvs. lanceolate to linear, sessile, with narrow auricles: fls. small, in early summer in paniced racemes: fr.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long and one-third as broad, tapering to base, truncate or notched at apex. Eu.

2. *I. glauca*, Auch. Strong very glaucous perennial, 2-4 ft.: radical lvs. large, oblong, obtuse, tapering to base; st.-lvs. with petiole-like bases and no auricles: fls. numerous in a very large terminal compound infl.: fr. about  $\frac{1}{2}$  in. long, narrow-oblong, obtuse or somewhat truncate-retuse. Asia Minor, Persia.

26. *PELTARIA*, L. SHIELDWORT. About 4 glabrous perennial herbs in the Medit. region, one sometimes grown for ornament.—Lvs. entire, those on the st. sagittate-clasping: fls. white or rose-colored, small, in large terminal clusters; stamens free and without appendages or teeth; stigma sessile: fr.

orbicular or obovate, much flattened and papery, indehiscent, on spreading pedicels; seeds 1-4, wingless, hanging in the compartment, the cotyledons accumbent. (Pelta-ria: Greek *small shield*, from the shape of the pod.)

**P. alliacea**, L. Erect, 10-15 in., branched, with an onion-like odor: lvs. oblong, 2-3 in., tapering to a clasping base, obtuse, entire, the upper ones narrow: fls. white, slender-pedicelled, numerous in many short terminal clusters or racemes, in spring and early summer: fr. nearly orbicular,  $\frac{1}{4}$ - $\frac{3}{8}$  in. across, with a seed in the center, shield-shaped. S. E. Eu.

**27. RAPHANUS**, L. Species 8 or 10, annual, biennial, perennial, Eu. to E. Asia, one much grown for food.—Glabrous or with scattered hairs, much branched: lvs. mostly lyrate-lobed or -pinnatifid: fls. mostly showy, white, pink, purplish, yellowish, slender-pedicelled, in open branched racemes; lateral sepals somewhat saccate; stamens free and unappendaged; style slender with slightly lobed stigma: fr. a long terete spongy indehiscent silique more or less constricted between the seeds, with a long beak; seeds globose or nearly so, wingless, cotyledons conduplicate. (Raph-anus: classical name.)

**R. sativus**, L. RADISH. Annual and biennial: root thick and fleshy, in many sizes, shapes and colors, much prized as a vegetable to be eaten raw: st. 2-3 ft., more or less glaucous: lvs. stalked, glabrous or with sharp hairs, lyrate-divided, the terminal segm. very large, the lateral pinnæ mostly 1-3 pairs: fls. white to lilac, mostly dark-veined: fr. 1-3 in. long, spongy and containing 1-6 seeds, with extended beak. Cultigen; perhaps a derivative from *R. raphanistrum*, L., now a widely distributed weed.

Var. **caudatus**, Alef. (*R. caudatus*, L.). RAT-TAILED RADISH. Root not developed: grown only for its great pods which are 8-12 in. or more long, curved and sometimes twisted, which are eaten as are radishes or used for pickles.

Var. **longipinnatus**, Bailey. Large and stout plant, with radical lvs. very long and narrow, sometimes 2 ft. long, with 8-12 pairs of pinnæ: usually a winter radish, with long, hard, and durable roots. The Chinese radishes, somewhat grown in this country, are mostly of this variety or race; so also is the daikon of the Japanese, to which the following names apply: *R. Taquetii*, Lév., *R. raphanistroides*, Nakai, and *R. sativus* forma *raphanistroides*, Makino. Other lf.-races are recognized but they are probably not grown in this country.

**28. CRAMBE**, L. Annual and perennial mostly fleshy glaucous herbs, about 20, glabrous or somewhat setose, mostly Canary Isls. to W. Asia, one known in vegetable-gardens.—Lvs. large, pinnately lobed or pinnatisect: fls. white, in long corymbose racemes, rather large; sepals all alike; filaments free, the longer ones usually toothed; stigma sessile: fr. a globular hard indehiscent 1-seeded body but borne on another slender undeveloped part or joint that looks like a stipe beyond the calyx; seed large and globose, hanging in the pod, cotyledons conduplicate. (Cram-be: the Greek name.)

Lower lvs. on the oblong order, narrowing at base.....1. *C. maritima*  
Lower lvs. ovate, cordate.....2. *C. cordifolia*

1. **C. maritima**, L. SEA-KALE. Fleshy big-leaved perennial, grown for the succulent spring shoots which are blanched: lvs. more or less cabbage-like, ovate-oblong in outline but variously shallowly lobed and notched, sometimes 2 ft. and more long: fls. showy on sts. to 3 ft. tall, about  $\frac{1}{2}$  in. across: fr. (or "seed") a globular or globular-oblong pod  $\frac{1}{4}$ - $\frac{3}{8}$  in. diam. Seacoasts and cliffs of W. Eu.

2. **C. cordifolia**, Stev. Tall, 4-7 ft. high, stately in bloom: lvs. large and heavy, 2-5 ft. across, the lower ones ovate in outline, cordate at base, dentate; st.-lvs. not distinctly cordate: fls. many, small, white, the leafless panicle overtopping the cluster of root-lvs. and several ft. across. Caucasus; grown for ornament.

## 68. RESEDACEÆ. MIGNONETTE FAMILY

Annual and perennial herbs or rarely shrubby, of 6 genera and about 65 species, mostly native in the Medit. region; two species are grown in flower-



gardens.—Lvs. alternate or fascicled, entire, 3-parted or pinnate, with gland-like stipules: fls. mostly bisexual, irregular, bracted, in terminal racemes or spikes; calyx persistent, 4-7-parted; petals usually 4-7, entire or cleft, hypogynous or perigynous; stamens 3-40, inserted on the irregular fleshy hypogynous disk; carpels 2-6, free or united into a 1-celled ovary which is usually open at top, the stigmas sessile, ovules many: fr. usually an indehiscent 3-6-lobed caps., sometimes a berry or composed of separate follicles.

**RESEDA, L.** Between 50 and 60 species, native mostly in the vicinity of the Medit. and the Red Sea.—Erect or decumbent herbs, sometimes partially woody at base: lvs. simple or compound: fls. small, in terminal spikes; petals 4-7, greenish, toothed or cleft; stamens 8-40, attached on one side of fl.: caps. 3-6-horned or -angled, opening only at top at maturity. (Rese-da: from Latin name of a plant, from word *to heal* or *assuage*.)

Lvs. entire or only notched.....1. *R. odorata*  
Lvs. pinnate or deeply pinnatifid.....2. *R. alba*

1. ***R. odorata, L. COMMON MIGNONETTE.*** Branching annual, at first upright but becoming wide-spreading and more or less decumbent: lvs. spatulate or ob-lanceolate, mostly obtuse, usually entire but sometimes notched: spikes becoming loose and open with age, the fls. very fragrant, yellowish-white, the petals finely cleft, anthers golden-yellow. N. Afr.—The mignonette has been greatly modified under cult. and there are many names representing stature- and habit-forms; also many named cultivars are in the trade. Grown for its fragrance.

2. ***R. alba, L. WHITE UPRIGHT MIGNONETTE.*** An erect rather coarse annual or biennial 1-3 ft. high, glabrous, sometimes grown in the flower-border: lvs. often crowded, pinnate or deeply pinnatifid, the segms. linear with entire or undulate margins: spike very long and slender, the fls. greenish-white, not sweet-scented, the 5 or 6 petals 3-cleft at top. S. Eu., adventive in N. Amer.

## 69. MORINGACEÆ. MORINGA FAMILY

A single genus of 3 species native in N. Afr. and trop. Asia.—Deciduous trees with gummy bark: lvs. alternate, 2-3-imparipinnate, the lfts. obovate, entire, caducous, stipules 0 or appearing as glands at base of the petioles and lfts.: fls. bisexual, irregular, perigynous, in axillary panicles, white or red; calyx with short tube and 5-parted limb, imbricated; petals 5, unequal, the lower reflexed; stamens in 2 series, 5 perfect ones inserted on the margin of the disk and 5 staminodia, the filaments free; ovary superior and stipitate, 1-celled with 3 parietal placentæ, ovules numerous, style 1 with minute stigma: fr. an elongated, beaked, 3-6-angled caps. dehiscing the whole length by 3 valves.

**MORINGA, Juss. (*Hyperanthera*, Forsk.)** One species is grown in warm countries for ornament; the root, which has a pungent taste like the horse-radish, is sometimes eaten; the young frs. are also edible and ben oil, sparingly used in the arts, is extracted from the seeds. Technical characters as for the family. (Moring-a: from native Malabar name.)

**M: oleifera, Lam. (*M. pterygosperma*, Gaertn.). HORSE-RADISH-TREE.** Small tree to 25 ft.: lvs. large, mostly 3-pinnate, all parts stalked: fls. white, fragrant, pedicelled, about 1 in. across: pods 1-1½ ft. long, the seeds large, 3-angled and winged. India; spontaneous and planted in W. Indies and N. S. Amer.; to be expected in S. Fla.

## 70. NEPENTHACEÆ. NEPENTHES FAMILY

“Pitcher-plants,” sometimes grown in hothouses for curiosity; one genus of about 60 species native in E. Indies, Malay Peninsula, N. Australia, the Seychelle Isls. and Madagascar, and numerous artificial hybrids.—Semi-woody, prostrate, climbing or rarely erect, sometimes epiphytic: lvs. alternate, exstipulate, sessile or with petiole which is usually winged, the flat blade with

2-12 or more longitudinal veins which are often inconspicuous in fresh specimens, the midrib prolonged into a tendril of varying length which is greatly expanded and hollowed at end forming the "pitcher"; the pitcher usually has 2 fringed or ciliate longitudinal wings in front with a flat area between, copiously veined, rim thickened into collar or peristome that is corrugated or ridged and shining and bears on its serrated inner edge the openings of large sunken glands the excretions of which attract insects which slide off into the watery fluid of the pitcher; midrib ending in short spur just behind the lid or operculum which may be small and narrow or large and cordate, usually with many nectar glands on the under surface: plants dioecious: fls. not showy, often fetid, in simple or paniced racemes opposite a bract-lf. which is sessile and differs in venation from the foliage lvs. in having fine oblique veins instead of longitudinal veins; sepals 4, distinct or rarely connate at base, thick, bearing nectar-glands on inner surface; petals 0; stamens 4-24, usually 8-10, connate into a column, bearing the anthers in a rounded crowded mass; ovary 1, superior, 4-celled with many ovules on central placenta, the style very short or none, with 4-lobed radiating stigma: fr. a caps. loculicidally dehiscent by 4 valves.—Other pitcher-plants belong to the family **SARRACENIACEÆ** which consists of 3 genera of about 10 species and several hybrids, native in N. Amer. and N. S. Amer., but are not commonly cult. The lvs. are all radical and some are pitched and variously colored; they lack the tendril-like midrib of the Nepenthaceæ. The fls. are large with commonly 5 sepals and petals, many free stamens, and in the genus *Sarracenia* a peculiar very large umbrella-like stigma. The **DROSERACEÆ**, of 4 genera and about 90 species of wide distribution, are noted insectivorous plants. *Dionæa muscipula*, Ellis, Venus Fly-Trap, is sometimes grown for botanical study. It is native in a restricted area about Wilmington, N. C., and grows about 1 ft. high; its lvs. are basal, consisting of a flat expanded petiole and a 2-lobed blade fringed with sensitive hairs which, when touched by an insect, cause the lf. to close and digestion takes place by means of glandular excretions: fls. white, rather large, in an umbel borne on long scape

**NEPENTHES, L. PITCHER-PLANT.** Characters as for the family. (Nepenthes: from Greek *without care*, in allusion to the statement in the Odyssey where Helen so drugged the wine-cup that its contents freed men from grief and care.)

Wings of pitcher narrow, cord-like.....1. *N. Phyllamphora*  
Wings of pitcher broad, doubly fringed.....2. *N. Hookeriana*

1. **N. Phyllamphora**, Willd. (*Phyllamphora mirabilis*, Lour.). Prostrate or climbing: lvs. petioled, elliptic-oblong, 6-18 in. long, glabrous, herbaceous, margins dentate-ciliate when young, with 6-10 longitudinal veins: pitchers nearly cylindric, the lower half slightly inflated, 3-6 in. long and 1-1½ in. across, pale green to reddish green or red, the wings narrow and cord-like; peristome cylindrical, pale green to purple; lid ovate or orbicular. (Phyllamphora: Greek for *leaf* and *pitcher*.) S. China, E. Indies.

2. **N. Hookeriana**, Lindl. Plants strong and high-climbing, young parts covered with dense tawny pubescence: lvs. petioled, elliptic-lanceolate, 10-24 in. long, somewhat leathery, with 5 longitudinal veins: pitchers 2-6 in. long and 1-3 in. across, dimorphic, the lower ovate or nearly globose, pale green with purple markings, the wings broad and doubly fringed; peristome with dentate margin, green or more or less striped with purple; lid oval or ovate, spur slender, recurved, densely tomentose; upper pitchers funnel-shaped with narrow unfringed wings. (Named for Wm. J. Hooker, 1785-1865, English botanist.) Borneo.—Perhaps a natural hybrid between *N. ampullaria* and *N. Rafflesiana*.

The species of *Nepenthes* hybridize readily and many of the named hybrid forms may be found in choice hothouse collections. A few of them are as follows:

**N. atrosanguinea**, Mast. (probably *N. distillatoria* × *N. Sedeni*). Pitchers reddish-purple mottled with pale green, wings fringed, wide below and narrow above. **N. Courtii**, Veitch (*N.?* × *N. Dominii*). Pitchers green mottled with purple, the wings fringed. **N. Dickinsoniana**, Lindsay (*N. Rafflesiana* × *N. Veitchii*). Pitchers cylindric-ventricose, somewhat villous, green with purple markings, the wings fringed, the lid oblong. **N. Dominii**, Veitch (*N. Rafflesiana* × ? a Bornean species probably *N. gracilis*). Pitchers ventricose below, contracted near mouth, mottled green and purple, wings fringed, broad below becoming narrower toward mouth, lid ovate. **N. edinensis**, Lindsay (*N. Rafflesiana* × *N. Chelsoni*). Pitchers ovate, yellow-green spotted with dark purple, wings broad and fringed, lid ovate. **N. Henryana**, Williams (*N. Hookeriana* × *N. Sedeni*). Pitchers cylindric-ventricose, red or greenish-red, mottled above, wings broad and ciliate, lid oval. **N. intermedia**, Veitch (*N. Rafflesiana* × a Bornean species). Pitchers ovate, green abundantly spotted with purple, wings fringed, peristome elevated into neck behind, lid ovate. **N. Mastersiana**, Veitch (*N. sanguinea* × *N. khasiana*). Pitchers dimorphic, crimson-green with purple spots to uniformly deep crimson, wings fringed or in upper pitchers rudimentary, lid ovate-orbicular. **N. Patersonii**, Hort. (Parentage unknown; probably *N. Phyllamphora* × *N. Hookeriana*). Pitchers cylindric-ventricose, yellowish-green copiously mottled with red, wings narrow and ciliate, lid oval. **N. Sedeni**, Mast. (Parentage not accurately known.) Pitchers cylindric, dilated at base and slightly contracted in middle, wings ciliate, the lid cordate-orbicular.

## 71. CRASSULACEÆ. ORPINE FAMILY

Mostly fleshy herbs and subshrubs, included by gardeners among "succulents," of perhaps 900 species and perhaps 20 clear genera of wide dispersion; a good many are grown under glass as pot subjects and the hardy ones in rock-gardens and borders.—Lvs. alternate, scattered or opposite, commonly sessile, simple or pinnate, without stipules, in the cult. kinds thick and fleshy; fls. mostly bisexual, usually small and cymose but sometimes racemose or even solitary, for the most part in shades of yellow and red more or less combined with green, the parts typically free and distinct, known to botanists by their symmetry; sepals (or lobes) usually of same number (4 or 5) as petal-parts and pistils, the stamens of the same or double their number; receptacle without disk but bearing a little scale behind each carpel: fr. a 1-celled ventrally dehiscent follicle few to many-seeded (seed rarely solitary).—Although the family presents in general much uniformity of structure and is readily recognized, there are marked departures: the petals are sometimes absent; corolla gamopetalous and lobed or comprised of separate petals; calyx mostly gamosepalous. Generic and specific names not here included are likely to be found in the special collections of amateurs and fanciers.

Stamens of same number as petals.

Petals separate or essentially so. .... 1. CRASSULA

Petals joined to the middle or higher. .... 2. ROCHEA

Stamens usually more than petals, commonly twice as many.

Corolla with parts free or essentially so (if joined, only slightly connate at base).

Floral parts typically in 4's or 5's; lvs. usually not in rosettes. .... 3. SEDUM

Floral parts in more than 5's, usually 6–20: basal lvs. in dense rosettes. .... 4. SEMPERVIVUM

Corolla usually distinctly gamopetalous, lobed only to middle or less (exceptions in No. 8).

Teeth or parts of calyx 5.

Tube of corolla elongated, much exceeding the calyx. .... 5. COTYLEDON

Tube of corolla very short, little if at all exceeding calyx. .... 6. ECHEVERIA

Teeth or parts of calyx 4.

Calyx much inflated, short-toothed. .... 7. BRYOPHYLLUM

Calyx little or not at all inflated, the parts nearly free or joined only to the middle. .... 8. KALANCHOË

1. CRASSULA, L. Species probably 150 or more, in the warm parts of the Old World, mostly S. African, a few grown under glass and in windows or planted in the open far S. mostly for their foliage and interesting habit.—More or less succulent leafy shrubs and herbs, rarely annual: lvs. fleshy,

opposite and mostly sessile although frequently taper-based, often connate by the bases, entire or nearly so, glabrous and shining or in some species pubescent or scaly: fls. mostly cymose or in compact clusters and thereby sometimes showy, white, rose, or seldom yellow; sepals, petals, and stamens of same number, usually 5 (sometimes as few as 4), the petals separate or connate only at base, the calyx parted or deeply cleft; carpels 5, with many ovules. (Crassula: Latin diminutive of *crassus*, thick.)

Lvs. narrowed into petiole-bases that are connate across the st.: petals white..... 1. *C. quadrifida*  
Lvs. narrowed but not petioled, not connate: petals red..... 2. *C. portulacæa*

1. *C. quadrifida*, Baker. Rather low herb with more or less decumbent base, moderately fleshy, glabrous: lvs. oval with a tapering base, about  $2\frac{1}{2}$ –3 in. long over all and  $1\frac{1}{2}$  in. broad, very obtuse, the petioles of the pairs joined: fls. paniced, about  $\frac{1}{4}$  in. across, 4-merous, petals white and very acute, carpels pink. S. Afr.

2. *C. portulacæa*, Lam. Shrub to 10 ft., oppositely regularly branching and making a symmetrical erect comely jointed pot-plant with a fleshy woody structure: lvs. very thick, shining, oval or obovate or oblong-spatulate, narrowed at base but not petioled, the bases not connate: fls. in a close panicle, rosy-red, 5-merous; petals narrow and mucronate. S. Afr.; sometimes grown in windows and conservatories under the misleading names "Japanese laurel" and "Japanese rubber-plant," often not blooming for years.

2. *ROCHEA*, DC. (*Kalosanthus*, Haw.). S. African plants, 4 or 5 species, of which one or two are sometimes grown in greenhouses.—Erect, more or less shrubby: lvs. opposite, sessile and somewhat joined at base, simple: fls. rather large, white, yellow, or red, in dense terminal clusters, making a showy infl.; calyx 5-parted; corolla salver-shaped, with tube much exceeding calyx; stamens 5, joined to claws of corolla-lobes; ovaries 5, many-ovuled: fr. follicular. (*Ro-chea*; named after M. de la Roche, French botanist.)

*R. coccinea*, DC. Robust, 1–2 ft., with very closely imbricated ovate or ovate-oblong lvs.  $1\frac{1}{2}$ –2 in. long, ciliate on margins: fls. bright scarlet,  $1\frac{1}{2}$ –2 in. long, fragrant, in summer, phlox-form, with long slender tube. Cape Colony.—Several forms or hybrids are in cult.; showy.

3. *SEDUM*, L. STONECROP. LIVE-FOR-EVER. The largest genus of the family, numbering 200–300 species, if defined broadly, of temp. and cold parts of the northern hemisphere and southward in mts.; favorite rock-garden subjects.—Mostly glabrous fleshy low herbs, many of them creeping and rooting, nearly all perennial: lvs. mostly alternate, in many species very small and imbricated: fls. in terminal cymes often with secund branches; calyx 4–5-parted; petals 4 or 5 and distinct, or sometimes slightly united just at the bottom, commonly narrow and very acute; stamens 8–10; carpels 4 or 5, mostly distinct but sometimes slightly connate at base, usually many-seeded. (Se-dum: Latin *to sit*, from the low squat stature of many species.)—Latin names are often much misapplied to the plants in cult.

\*A. Species without rootstock or rhizome, annual or perennial.

B. Lvs. flat, ovate, hairy, the radical ones forming a rosette..... 1. *S. sempervivoides*

BB. Lvs. nearly terete, glabrous,  $\frac{3}{4}$  in. or less long..... 2. *S. cæruleum*

AA. Species without rootstocks, the sts. perennial and evergreen, mostly creeping and rooting and usually forming tufts or mats.

B. Fls. white (or pinkish-white): lvs. nearly or quite terete.

C. Lvs. and infl. glandular-pubescent: plant pinkish..... 3. *S. dasphyllum*

CC. Lvs. and infl. not pubescent: plant green.

D. Plant with crowded linear lvs..... 4. *S. lydium*

DD. Plant with alternate or scattered, oblong, obovate, or elliptic lvs.

E. Which are  $\frac{1}{4}$  in. or more long: infl. of several branches... 5. *S. album*

EE. Which are less than  $\frac{1}{4}$  in. long: infl. of 2 or 3 branches... 6. *S. anglicum*

BB. Fls. red or pink.

C. Lvs. terete..... 7. *S. pulchellum*

CC. Lvs. flat, obovate and prominently crenate-serrate..... 8. *S. spurium*



- ccc. Lvs. flat, spatulate, entire or essentially so..... 9. *S. stoloniferum*  
 BBB. Fls. yellow.  
   c. Lvs. opposite or whorled..... 10. *S. sarmentosum*  
   d. And glabrous..... 11. *S. Stahlia*  
 DD. And downy.....  
 CC. Lvs. alternate.  
   d. Apex of lf. blunt, the lf. ovoid-triangular..... 12. *S. acre*  
   DD. Apex blunt, the lf. linear..... 13. *S. sexangulare*  
 DDD. Apex very acute, lf. long and narrow..... 14. *S. reflexum*  
   E. And terete..... 15. *S. rupestre*  
   EE. And flat above.....  
 AAA. Species with prominent perennial rootstocks or rhizomes (or caudex), to which the tops more or less die back: mostly tall plants.  
   B. Rootstock not caudex-like, without scaly or leafy apex, often tuberous, often long and slender with thin roots: fls. bisexual, 5-merous.  
   c. Fls. white, red, purple, or green.  
     d. Sts. short and weak, prostrate or creeping: lvs. 1 in. or less long, broad..... 16. *S. Anacampseros*  
     E. Lvs. alternate..... 17. *S. Sieboldii*  
     EE. Lvs. in 3's.....  
     DD. Sts. stout and erect, 1-2 ft.: lvs. 2-4 in. long.  
       E. Stamens very prominent, much exceeding the pink petals..... 18. *S. spectabile*  
       EE. Stamens not conspicuous, little if any exceeding the petals.  
         F. Corolla greenish-white: carpels rose-colored: lvs. usually opposite..... 19. *S. alboroseum*  
         FF. Corolla and carpels green: lvs. usually opposite..... 20. *S. maximum*  
         FFF. Corolla red-purple: lvs. alternate..... 21. *S. Telephium*  
   CC. Fls. bright yellow.  
     d. Plant with many barren sts. and creeping habit..... 22. *S. hybridum*  
     DD. Plant otherwise erect.  
       E. Pedicels evident, at least in lower fls. in cluster..... 23. *S. Middendorffia* [num  
       F. Infl. dense: lvs. linear..... 24. *S. kamtschaticum*  
       FF. Infl. loose: lvs. spatulate..... 25. *S. Aizoon*  
       EE. Pedicels none (fl. sessile).....  
 BB. Rootstock an erect fleshy caudex bearing at the top broad scales: from the axils of which arise annual leafy flowering shoots: diceious: fls. mostly 4-merous..... 26. *S. roseum*

1. *S. sempervivoides*, Fisch. Pubescent biennial making a first-year rosette of very fleshy purplish ovate-acute lvs. nearly 1 in. long, and with similar lvs. alternate on the flowering st. that rises 6-12 in. the following year, blooming in summer: fl.-cluster 2-4 in. across, the red 5-parted fls. about  $\frac{1}{2}$  in. across; stamens nearly twice as long as sepals: fr. crimson. Asia Minor and Caucasus.

2. *S. cæruleum*, Vahl. Branching little annual, 3-4 in. high, somewhat hairy: lvs. alternate, ovoid or oblong, sessile, slightly flattened above but otherwise terete,  $\frac{3}{4}$  in. or less long: fls. in summer, terminating all the branches, 7-9-parted,  $\frac{1}{4}$  in. across; petals blue with white base, somewhat exceeding stamens: fr. becoming red. Medit. region.

3. *S. dasyphyllum*, L. Tufted evergreen 1-2 in. high, pinkish-gray: lvs. opposite, ovoid to obovoid, slightly flattened on one side but otherwise rounded,  $\frac{1}{8}$ - $\frac{1}{4}$  in. long, glandular-pubescent: fls. in early summer,  $\frac{1}{4}$  in. across, 5-6-parted; petals white on front with yellowish base and pinkish on back, exceeding the stamens: fr. nearly erect, greenish. Eu., N. Afr.

4. *S. lydium*, Boiss. Very small evergreen 1-3 in. high, usually tinged red, the little sts. rooting and sending up branches bearing terete linear sessile crowded lvs. about  $\frac{1}{4}$  in. long: fls.  $\frac{1}{4}$  in. across, in early summer; petals white, about the length of the stamens: fr. white turning red. Asia Minor (Lydia being an ancient geographical name in that region.)

5. *S. album*, L. Commonly cult., variable: glabrous, creeping, evergreen, forming a large mat, fl.-sts. 3-8 in. high: lvs. alternate, linear-oblong to obovate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, terete or flattened above, sessile: fls. in summer,  $\frac{3}{8}$  in. across; petals obtuse, white, about equaling stamens: fr. erect, white streaked red. Eu., Asia, N. Afr.

6. *S. anglicum*, Huds. A little glabrous evergreen, with slender creeping sts. making mats, sts. 1-2 in. high: lvs. alternate, crowded, elliptic, sessile, terete,  $\frac{1}{4}$  in. or less long: fls.  $\frac{1}{2}$  in. across, in early summer, on 2, sometimes 3, simple

branches; petals white, pinkish on back, equaling stamens: fr. white but turning red, erect. W. Eu.

7. *S. pulchellum*, Michx. Ascending, 4-12 in., not creeping, evergreen, glabrous: lvs. many and crowded, linear and terete, about  $\frac{5}{8}$  in. long, obtuse, forked at base: fls. mostly 4-parted, nearly  $\frac{1}{2}$  in. across, sessile on radiating recurved branches, rosy-purple and showy, in summer; stamens shorter than the acute petals: fr. tinted, long-tapering. E. U. S.

8. *S. spurium*, Bieb. (*S. oppositifolium*, Sims). Nearly evergreen, pubescent, with creeping sts. forming mats, the reddish fl.-sts. about 6 in. high: lvs. opposite, about 1 in. long, obovate with cuneate base, prominently crenate-toothed on upper part, ciliate: fls. 1 in. long, pink (varying to white), on about 4 forked branches, in summer; stamens shorter than petals: fr. reddish, with spreading beaks. Caucasus region.—Variable in color and common in cult.; sometimes cult. under the name *S. pallidum* and var. *roseum*.

9. *S. stoloniferum*, Gmel. Nearly evergreen, scabrous but not pubescent, creeping, fl.-sts. rising about 6 in., the bloom in early summer: lvs. opposite, broadly or rhomboidly spatulate, about 1 in. long, entire or obscurely crenate toward top, pimpled on the margin: fls.  $\frac{1}{2}$  in. across, nearly sessile, on 3 spreading forked branches; petals rose-colored, acute, considerably exceeding the stamens: fr. spreading and sepals persistent, giving a 10-rayed effect. S. W. Asia.—Often confused with No. 8.

10. *S. sarmentosum*, Bunge (not Masters). Glabrous evergreen making long prostrate barren shoots that root at the tip: lvs. ternate, broad-lanceolate, acute, 1 in. long, flat and fleshy and entire, spurred at base: fls. in summer,  $\frac{5}{8}$  in. or less across, mostly sessile on 3 often forked branches, bright yellow; stamens shorter than the narrow acute petals: fr. exceeded by the persistent calyx. N. China and Japan.

11. *S. Stahlianii*, Solms. Evergreen, finely pubescent, with many erect or slender sts. 4-8 in. high, woody at base: lvs. opposite, ovate, obtuse,  $\frac{1}{2}$  in. long, thick: fls. about  $\frac{1}{2}$  in. across, summer to autumn, nearly sessile on 2 or 3 forked branches, yellow; stamens slightly shorter than the short-acuminate petals: fr. (or carpels) yellow. (Bears the name of Prof. Ernst Stahl, Jena, Germany.) Mex.

12. *S. acre*, L. The common stonecrop of walls, rocky places, and yards, naturalized from the Old World, and often colonized as a moss-like cover plant: small creeping glabrous mat-forming evergreen, the shoots rising 1-3 or more in., lvs. alternate and imbricated, ovoid-triangular and therefore broadest near base,  $\frac{1}{4}$  in. or less long: fls. late spring or summer,  $\frac{1}{2}$  in. across, bright yellow, on 2 or 3 short branches; stamens shorter than the lanceolate acute petals: fr. wide-spreading.—There are kinds with yellow and variegated foliage, and also of large stature (var. *majus*, Masters).

13. *S. sexangulare*, L. Small glabrous evergreen, forming a mat, sts. creeping, fl.-sts. 3 in. high, barren shoots many: lvs. linear, terete, obtuse,  $\frac{1}{4}$  in. or less long, commonly in 6 spiral rows (hence the name), spurred at base: fls. in summer,  $\frac{3}{8}$  in. across on 3 short branches, yellow; stamens shorter than the acute spreading petals: fr. spreading, tapering. Eu.

14. *S. reflexum*, L. Variable creeping glabrous evergreen, forming a mat, the fl.-sts. 6-12 in. high and unbranched: lvs. alternate and crowded, terete and acute,  $\frac{1}{2}$  in. long, short-spurred at base: fls. in summer, 5-7-parted,  $\frac{5}{8}$  in. across, on 3 to 5 forked branches (infl. drooping in bud), bright yellow; stamens shorter than the linear-lanceolate acute keeled petals: fr. tapering. Eu.

15. *S. rupestre*, L. Recognized by its crowded linear lvs. flat on the upper surface, otherwise much like No. 14; evergreen, creeping, usually glaucous, the ascending branches shaggy at base with withered lvs.; sts. much branched: lvs. linear to linear-oblancheolate,  $\frac{5}{8}$  in. or less long: fls. golden-yellow. Eu.

16. *S. Anacampseros*, L. Nearly evergreen, glaucous, glabrous, procumbent, sometimes rooting, fl.-sts. about 6 in. high: lvs. alternate, sessile and flat,  $\frac{1}{2}$ -1 in. long, obovate to orbicular, rather thin, rounded at end and sometimes slightly retuse or apiculate, margins entire: fls. in summer, not widely expanding,  $\frac{1}{4}$  in. across, in a very dense cluster, dull purple; stamens about equaling the ovate-lanceolate obtuse petals: fr. erect, with short tips. (*Anacampseros* is an old Greek name, now applied also to a genus in Portulacaceæ.) S. Eu.

17. *S. Sieboldii*, Sweet. Well-known decumbent hardy late autumn-blooming species with long unbranched sts. on the ground, blooming at the end, and a cluster of thick roots: lvs. in 3's, glaucous-blue or sometimes red, nearly orbicular but

truncate or somewhat tapering at base,  $\frac{3}{4}$ –1 in. long, flat, sinuate or obscurely toothed above: fls. nearly  $\frac{1}{2}$  in. across, in dense heads, pink; stamens, part of them, slightly exceeding the broad-lanceolate acute petals: fr. erect, attenuate-pointed. (P. F. von Siebold, page 87.) Japan.

18. *S. spectabile*, Boreau. Robust glaucous showy sedum, well known in cult., 12–18 in. high, from a clump of long tubers, the sts. unbranched: lvs. opposite or in 3's and widely spreading, 3 in. or more long and two-thirds as broad, obovate, fleshy, somewhat toothed: fls. in autumn, very many in a large dense corymb,  $\frac{1}{2}$  in. across, pink; stamens prominent, part of them much longer than the lanceolate acute petals: fr. erect, attenuate. Japan and Cent. China.—Races with deeper colored fls. are known as Brilliant, or var. *atropurpureum*.

19. *S. alboroseum*, Baker (*S. japonicum*, Hort., not Sieb.). Tall glaucous glabrous plant with tuberous roots, the fl.-st. 1–2 ft., unbranched, annual, blooming in early autumn: lvs. mostly opposite but sometimes alternate or ternate, ovate to obovate-cuneate, 2–3 in. long and half as broad, obtusely toothed: fls. greenish-white,  $\frac{1}{2}$  in. across, in terminal and axillary corymbs; stamens about equaling the oblong-lanceolate acute petals: fr. erect, acuminate, pinkish or rose when young. Japan, China.—One of the plants known in gardens as *S. macrophyllum*; see also No. 20. The true *S. japonicum* of Siebold is probably not in cult. in this country.

20. *S. maximum*, Suter. Variable species, one of the plants likely to be grown as *S. macrophyllum*: glabrous, roots thickened, fl.-sts. erect, 1–3 ft., annual, blooming late summer to autumn: lvs. prevailingly opposite or sometimes ternate or even alternate, broad-ovate, 2–3 in. long and half or two-thirds as broad, obtuse, irregularly and obscurely toothed: fls. green,  $\frac{3}{8}$  in. across, in terminal and axillary corymbs; stamens slightly exceeding the ovate-lanceolate somewhat acute petals: fr. erect and short-acuminate, green. Eu., S. W. Asia.—Var. *atropurpureum* has lvs. and st. deep purple.

21. *S. Telephium*, L. Wide-spread and very variable species from W. Eu. to Japan, represented in the American native flora by *S. telephioides*, Michx., distinguished from Nos. 19 and 20 by the red-purple fls. in late summer and autumn and always alternate lvs.: sts. clustered, glabrous: lvs. strongly ascending, about 3 in. long and half as broad, obovate-oblong and tapering below and the upper ones oval, toothed toward apex: stamens nearly equaling the lanceolate acute petals. (*Telephium* is an old name from *Telephus*, son of Hercules, of some obscure application; employed also as a generic name in Caryophyllaceæ.)—With this species *S. purpureum*, Link, and *S. Fabaria*, Koch, are to be associated as vars. or subspecies.

22. *S. hybridum*, L. Evergreen, glabrous, mat-forming, with prominent barren shoots, sts. creeping and branching, fl.-sts. 3–6 in. high, blooming in spring and again later: lvs. alternate, oblong-lanceolate to spatulate, about 1 in. long, coarsely toothed on upper half with teeth often tipped red: fls. yellow,  $\frac{1}{2}$  in. across, in much-branched terminal cyme; stamens about two-thirds as long as the lanceolate mucronate somewhat hooded petals: fr. slightly connate at base, green or red. Siberia, Mongolia.

23. *S. Middendorffianum*, Maxim. Glabrous and tufted, lacking barren sts., not creeping, fl.-sts. many, 6–12 in. high, dying to ground in autumn, mostly unbranched and blooming in summer, the next year's shoots arising late in summer: lvs. many, alternate, nearly linear, about  $1\frac{1}{2}$  in. long, fleshy but not terete, small-toothed toward apex: fls. yellow,  $\frac{5}{8}$  in. across, on about 4 forked branches forming a rather dense infl.; stamens two-thirds length of lanceolate, acute, keeled petals: fr. red, stellate. (Bears the name of A. T. von Middendorff, botanical traveler in N. Siberia.) Siberia, Manchuria.

24. *S. kamschaticum*, Fisch. & Mey. Glabrous, without barren shoots, not creeping, the fl.-sts. 6–9 in. high blooming in summer, having arisen the previous summer and remained green over winter, producing axillary fl.-branches: lvs. alternate or opposite, spatulate to obovate,  $1\frac{1}{2}$ –2 in. long, toothed toward apex, margin papillose: fls. orange-yellow,  $\frac{3}{4}$  in. across, in loose umbellate cymes; stamens nearly as long as the lanceolate apiculate petals: fr. crimson or brown, wide-spreading. N. E. Asia, China.

25. *S. Aizoon*, L. (*S. Maximowiczii*, Regel). Glabrous, without barren shoots, leafless in winter, with a thick knotted rootstock from which fleshy and tuberous roots arise; the sts. arise from the stock in spring and bloom in summer, 1– $1\frac{1}{2}$  ft. high, branched only above if at all: lvs. alternate, linear-lanceolate to ovate-lanceolate, 2–3 in. long, sharply toothed: fls. yellow to orange, sessile,  $\frac{1}{2}$  in. across, in a crowded terminal cyme; stamens nearly as long as the linear-lanceolate apicu-

late petals: fr. yellow to red, spreading. (Aizoon; also a genus in Portulacaceæ, is Greek signifying *always alive*.) Siberia to Japan; common in cult.

26. **S. roseum**, Scop. (*S. Rhodiola*, DC. *Rhodiola rosea*, L.). ROSE-ROOT. Glaucous, dioecious, variable, with thick scaly-topped stock that rises above the ground; sts. annual, 6-12 in. high: lvs. scattered and imbricated, sessile, strap-shaped to obovate, about  $1\frac{1}{2}$  in. long and half as broad, somewhat toothed at apex: fls. in spring and early summer, 4-parted, yellow or greenish-yellow, or the pistillate ones purplish, about  $\frac{1}{4}$  in. across; stamens slightly exceeding the linear obtuse petals. Circumpolar regions; south to N. Y. and Pa.

4. **SEMPERVIVUM**, L. HOUSELEEK. Differs technically from *Sedum* in the parts of the fl. being 6 to many, the stamens usually twice as many as calyx-lobes, petals and pistils: the petals are distinct, acute or acuminate: plants succulent and mostly condensed, the thick lvs. usually in dense rosettes and multiplying much by offsets: fls. yellow or purple, in cymose panicles. (*Sempervivum*: Latin *live forever*.)—Species probably upwards of 60 or 70 if the genus is defined inclusively, in the Old World; they are little grown except by amateurs and specialists. Planted sometimes for edgings, but mostly in rock-gardens. Some of them that freely produce many detached offsets are known as *Hen-and-Chickens*, *Old-Man-and-Woman*.

- A. Plants with secondary rosettes on the offsets, very small, herbaceous.
  - B. Fls. wide-spreading (wide open) at maturity, 9-merous or more.
    - c. Rosette webby (lvs. connected by gossamer hairs)..... 1. *S. arachnoideum*
    - cc. Rosette not webby or arachnoid.
      - d. Lvs. of rosette pubescent.
        - E. New or secondary rosettes sessile..... 2. *S. assimile*
        - EE. New rosettes peduncled..... 3. *S. flagelliforme*
      - DD. Lvs. of rosette glabrous.
        - E. Shape of rosette lvs. broad, usually obovate..... 4. *S. tectorum*
        - EE. Shape narrow, being oblanceolate-cuneate.
          - F. Tip of rosette lvs. distinctly red-brown
            - G. And the lvs. glaucous..... 5. *S. Greenii*
            - GG. And not glaucous..... 6. *S. arvense*
          - FF. Tip not manifestly red-brown..... 7. *S. Funckii*
    - BB. Fls. not wide-spreading, mostly 6-merous.
      - c. Lvs. oblanceolate..... 8. *S. arenarium*
      - cc. Lvs. obovate..... 9. *S. sobotiferum*
- AA. Plants without secondary rosettes on the offsets, shrubby..... 10. *S. spathulatum*

1. **S. arachnoideum**, L. COBWEB HOUSELEEK. Little plant with fl.-sts. 3-4 in. high: rosettes crowded at base,  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam., about 50-leaved, the lvs. oblong-cuneate and cuspidate, connected by cobwebby strands, outer ones about  $\frac{3}{4}$  in. long, the new rosettes crowded and sessile: fl.-sts. leafy, hairy, bearing a forking cluster at top; fls. 9-12-merous, 1 in. across, bright red, the calyx-segms. linear and petals lanceolate. S. Eu.; several forms are known in cult.

2. **S. assimile**, Schott. Rosettes  $1\frac{1}{2}$ -2 in. diam., the new ones sessile, bearing 60-80 obovate-cuneate cuspidate pale glaucous lvs., green and not red-tipped, minutely pubescent, margins short-ciliate, the outer lvs. 1 in. or less long: sts. rising about 6 in., bearing 12-merous pale rose fls. about  $\frac{3}{4}$  in. across, the calyx-segms. lanceolate and the petals linear. Transylvania.

3. **S. flagelliforme**, Fisch. Rosettes  $1-1\frac{1}{2}$  in. diam., the new ones long-peduncled and not dense; lvs. 40-50 to a rosette, oblanceolate and only obscurely cuspidate, minutely downy, pale green and not red-tipped, margin ciliate, outer ones  $\frac{3}{4}$  in. long; st. 3-4 in. high, with imbricated lanceolate hairy lvs.: fls. 6-8 in a dense head, sessile or nearly so, about 12-merous, bright red and about 1 in. across, the calyx densely hairy and with lanceolate segms., petals linear and glandular-pilose outside. Probably Siberia.

4. **S. tectorum**, L. COMMON HOUSELEEK. Rosettes 3-4 in. across, with 50-60 cuneate-obovate cuspidate lvs.  $1\frac{1}{2}$ -3 in. long, stoloniferous, with secondary sessile or stalked rosettes; st.-lvs. oblong-lanceolate and acute: stout plant, with densely hairy erect fl.-st. 6-12 in. high: fls. mostly 12-merous,  $\frac{3}{4}$ -1 in. across, pink-red, on second curving branches of a 10-12-branched panicle; calyx pilose, the segms. lanceolate; petals linear, with a deeper red keel. Eu., Asia; somewhat run wild in U. S.—Not to be confused with *Echeveria secunda*.

5. **S. Greenii**, Baker. Rosettes about  $1\frac{1}{2}$  in. diam., the new ones nearly sessile: lvs. 40-50 in a rosette, oblanceolate and cuneate, cuspidate, glabrous and glaucous



with a prominent red-brown tip, the outer ones 1 in. or less long; st.-lvs. imbricated, lanceolate and hairy, red-tinted, 1 in. or less long; sts. rising to 6 in., bearing 11-12-merous pale red panicked fls. about  $\frac{1}{2}$  in. across, the calyx densely hairy and petals strongly ciliate. Probably French Alps; a garden plant described from specimens sent by Mr. Green, Reigate, England.

6. *S. arvernense*, Lecq. & Lam. Rosettes  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. diam., with many stolons; lvs. 50-60 to a rosette, oblanceolate-cuneate, cuspidate, bright and pale green, glabrous, the tips with a distinct red-brown blotch, the outer lvs.  $1\frac{1}{4}$  in. or less long; st. rising 6-8 in., densely hairy, bearing pale pink fls. in a panicle; calyx-segms. lanceolate and petals linear. France (Arverni, or Auvergne, is a region in France).

7. *S. Funckii*, F. Braun. Rosettes  $1\frac{1}{2}$ -2 in. diam., closely surrounded by young rosettes on red decumbent peduncles; lvs. 80-100 in a rosette, oblanceolate-cuneate, cuspidate, green, glabrous or slightly hairy when young, the outer lvs.  $\frac{3}{4}$  in. or less long and the lower st.-lvs. about 1 in. long; st. 6-9 in. high, densely hairy, bearing bright red-purple 11- or 12-merous panicked fls. about 1 in. across; calyx-segms. lanceolate and petals glandular-pubescent outside. (Named for Funck, an apothecary.) S. Eu.

8. *S. arenarium*, Koch. Rosettes globular and deciduous, bearing 60-80 oblanceolate acute bright green glabrous lvs., of which the outer ones are  $\frac{3}{4}$  in. or less long and slightly red-brown on the back, the cauline ones ovate-lanceolate: sts. 6-9 in., leafy and pubescent, bearing many pale yellow 6-merous fls. in a dense head which is 2-3 in. through; calyx-segms. and petals lanceolate, the latter 3-cuspidate. Tyrol.

9. *S. soboliferum*, Sims. HOUSELEEK. Robust plant with fl.-sts. 6-9 in. high and finely pubescent: rosettes globose, 1- $1\frac{1}{2}$  in. diam. with 60-80 cuneate-ovate indifferently cuspidate light green glabrous lvs. with margins minutely ciliate, the outer lvs. 1 in. or less long, the many new rosettes sessile and slenderly connected with the parent and easily detached: fls. 6-7-merous, pale yellow, in a short dense many-fl. panicle; calyx-segms. ciliate on margin; petals lanceolate, margins fimbriate, and obscurely tricuspidate at apex. Austria.

10. *S. spathulatum*, Hornem. A shrubby plant with stout branched st., the branches horizontal and then arching upward: rosettes flat and not dense, the lvs. oblong-spatulate and acute with papillose margins and red-brown linear markings on both surfaces, the st.-lvs. linear-lanceolate and acuminate: fls. many, in panicles, 8-10-merous; calyx-segms. deltoid and petals oblong-lanceolate acute. Canary Isls.

5. **COTYLEDON**, L. Upwards of 50 species of succulents, if held to include Umbilicus, largely of S. Afr., but some in the Medit. region and Asia, little known in cult. in this country, some of them adaptable to walls and rockeries, others to growing under glass.—Plants of various habit, lvs. rosulate at base or plant tall with st. rosettes, or sometimes with scandent tendency, the parts thick and fleshy: lvs. petiolate or sessile, opposite or alternate, simple: fls. erect or pendent, whitish, yellow, red, or greenish, in terminal racemes or cymes; calyx 5-parted; corolla gamopetalous, tubular, cylindrical, or urn-shaped, sometimes angled, usually much exceeding calyx; stamens 10, mostly included; pistils 5, free, with narrow scale at base of each: fr. of several-seeded follicles. (Cotyle-don: ancient Greek name, a cavity, from the cup-like lvs. of some kinds.)

*C. orbiculata*, L. Sometimes seen in conservatories, variable, with several named forms: stout branching plant 2-4 ft. high: lvs. opposite, oblong to roundish-obovate or spatulate, 2-4 in. long, flat, entire, glaucous and powdery, often margined red or purple: fls. red, drooping in a panicle that has a peduncle 2 ft. long, the divisions of corolla reflexed, appearing in summer; corolla-tube  $\frac{3}{4}$ -1 in. long, four to five times as long as calyx and also much longer than its limb.

6. **ECHEVERIA**, DC. American representatives of Cotyledon, not sufficiently distinct from that genus: distinguished typically by the lack of pronounced corolla-tube, which does not exceed calyx, and acute corolla-lobes or petals, and strongly angled corolla broad at base; there are also general but not dependable differences in habit: lvs. commonly broad and flat, making dense rosettes: fls. in loose simple spikes or racemes, sometimes paniculate:

species probably 100 in the western hemisphere, a few of them grown under glass and sometimes planted out and used for flat carpet-bedding. (Echeveria: Atanasio Echeverria, Mexican botanical draughtsman.)

Plant with basal rosette, from which the peduncles or scapes arise.

Calyx-lobes prominent, linear to ovate.....1. *E. secunda*

Calyx-lobes minute, not evident.....2. *E. agavoides*

Plant 2 ft. or more, branched and leafy above the rosette.....3. *E. gibbiflora*

1. *E. secunda*, Booth (*Cotyledon secunda*, Baker). Acaulescent, producing stolons that bear offsets: lvs. erect or nearly so in a sempervivum-like rosette, cuneate-obovate, narrowed to a short sharp point, glabrous, glaucous-blue, margins usually reddish: scapes weak, 6-15 in. long, bracted, glaucous, bearing 8-24 pedicelled reddish fls. along one side; corolla about  $\frac{1}{2}$  in. long, divided nearly to the base, the lance-acute lobes once or twice exceeding calyx, not spreading. Mex.; common in cult., often planted out for edgings.

2. *E. agavoides*, Lem. (*Cotyledon agavoides*, Baker. *Urbinia agavoides*, Britt. & Rose). Small and compact plant: lvs. stiff, in a dense rosette, ovate, acute, 2-2 $\frac{1}{2}$  in. long, spine-tipped, gray-green on both sides and papillose: scapes from the rosette, 8-12 in. long, with fls. 8 or less on long pedicels; fls. yellow-red; calyx several times shorter than the cone-shaped corolla, the lobes of which are free three-quarters of the length. Mex.

3. *E. gibbiflora*, DC. (*Cotyledon gibbiflora*, Moc. & Sessé). Tall and branching, 1-2 ft. high, glabrous: lvs. obovate-spatulate or long-cuneate, 5-7 in. long, glaucous, in a rosette near the ground and also aggregate at ends of branches, becoming pinkish: fls. in spreading panicleate secund racemes, short-pedicelled, red, about  $\frac{1}{2}$  in. long, the corolla strongly angled; corolla-lobes lanceolate and long-acuminate, three or four times as long as the unequal calyx-lobes. Mex.—Var. *metallica*, Baker (*E. metallica*, Lem.), probably the commoner form in cult., has glaucous-purple foliage with metallic sheen: perhaps distinct.

7. **BRYOPHYLLUM**, Salisb. Four trop. plants native in Old World (chiefly Afr.), one widely spread and grown under glass for ornament and interest.—Erect fleshy branched perennials: lvs. opposite, simple or pinnate, margins commonly crenate-dentate: fls. bisexual, hanging in a large cymose or panicleate infl.; corolla 4-lobed, the tube partly or wholly covered by the much inflated 4-lobed calyx; stamens 8, attached on corolla-tube; disk present, 4-lobed; ovaries 4, distinct or somewhat connate, ovules many: fr. follicular. (*Bryophyllum: sprouting-leaf.*)

Lvs. simple.....1. *B. cruentum*

Lvs. pinnate.....2. *B. pinnatum*

1. *B. cruentum*, Baker. Plant 2-3 ft., glaucous-blue: lvs. simple, the blade ovate, 1-3 in. long, base rounded or cordate and sometimes auriculate on the petiole, coarsely crenate-dentate: fls. small, the calyx  $\frac{3}{4}$  in. long and red corolla  $\frac{3}{4}$  in. long, the corolla-lobes with rounded segms. Madagascar.

2. *B. pinnatum*, Kurz (*B. calycinum*, Salisb.). Stout plant 1-5 or 6 ft. tall, glabrous and more or less glaucous, the sts. terete and hollow: lvs. opposite, pinnate (the early ones simple), fleshy becoming leathery; lfts. 3-5, very short-stalked, oval, oblong or elliptic, 2-5 in. long, crenate and producing young plants from the crenatures even after removal from the plant: calyx paper-like and much inflated, 1-1 $\frac{1}{2}$  in. long, greenish- or yellowish-white and often purple-tinted; corolla much thinner than calyx, more or less prominently projecting (sometimes nearly twice the length of calyx), reddish, the lobes acute. Probably native in E. Indies, but now established in trop. and subtrop. countries and known under many names, as Air-Plant, Life-Plant, Floppers; grown under glass for students in botany to illustrate natural propagation by means of lvs.

8. **KALANCHOË**, Adans. Defined broadly, this genus has more than 100 described species, 1 in Brazil and the others in trop. Asia and Afr.; one or two sometimes seen in greenhouses.—Erect, sometimes slightly woody at base: lvs. opposite, fleshy, simple but sometimes pinnatifid: fls. medium to large, many in terminal paniced cymes, yellow, scarlet or purple, often showy; calyx and corolla 4-parted; corolla urn-shaped or salverform, exceeding the

calyx; stamens mostly 8; ovaries 4, joined to base of corolla-tube, many-ovuled; fr. follicular. (*Kalanchoë*: adapted from Chinese name; sometimes spelled *Calanchoe*.)

**K. carnea**, Mast. St.  $1\frac{1}{2}$ –2 ft., simple up to infl., glabrous: lvs. oval or obovate, more or less drooping, short-petioled, 3–4 in. long, obtuse, margins crenate-dentate: fls. light rose or pink and fragrant, nearly  $\frac{1}{2}$  in. across; calyx with linear pointed lobes separated to base; corolla-tube much exceeding calyx, swollen at base, the wide-spreading lobes broad and acute. S. Afr.

## 72. SAXIFRAGACEÆ. SAXIFRAGE FAMILY

Plants of various habit, inhabiting mostly temp. and subarctic regions; genera usually considered to be about 70, but by segregation the number may be 100; species 900–1,100; the family comprises ornamental herbs and shrubs and also pomological species.—The family is allied to Rosaceæ but differs in having fewer or more definite stamens, carpels mostly fewer than sepals and sometimes combined into a single compound pistil, lvs. usually without stipules and sometimes opposite: fls. bisexual or unisexual, usually regular; sepals prevailing 4 or 5, and petals and stamens of same number or stamens twice as many, the petals and stamens inserted at the edge of a disk; carpels free or united, inferior or superior, the fr. a caps. or berry with many seeds that contain abundant albumen.

- A. Species herbaceous, annual or dying to ground at winter: fr. capsular.
  - B. Ovary 2- or 3-celled, or else all the carpels nearly distinct.
    - c. Lvs. simple or 3-foliate: fls. bisexual: mostly low herbs.
      - d. Rhizome not evident, or at least not stout and thick: lvs. without gland-bearing pits on the surface (if pits are present, not glandular)..... 1. SAXIFRAGA
      - dd. Rhizome stout, thick and hard: lvs. with glanduliferous pits .... 2. BERGENIA
    - cc. Lvs. 2–3-ternate: fls. polygamous: large herbs..... 3. ASTILBE
  - bb. Ovary 1-celled, with 2 parietal placentæ: petals very small..... 4. HEUCHERA
- AA. Species woody, shrubs, climbers or small trees: fr. capsular or baccate.
  - B. Lvs. opposite.
    - c. Stamens 8, 10, or 12.
      - d. Fls. in large mostly dense cymes or panicles; infl. usually with marginal enlarged sterile fls., or sometimes all the fls. sterile and expanded.
        - e. Styles 2–5: sterile fls. 4–5-parted..... 5. HYDRANGEA
        - ee. Style 1: sterile fls. of 1 stalked lobe..... 6. SCHIZOPHRAGMA
      - dd. Fls. in racemes or little clusters; infl. uniform, of one kind of fl. ... 7. DEUTZIA
  - cc. Stamens numerous.
    - d. Ovary (and caps.) inferior, 3–5-celled ..... 8. PHILADELPHUS
    - dd. Ovary (and caps.) superior, 5–7-celled..... 9. CARPENTERIA
- BB. Lvs. alternate.
  - c. Fr. a caps.
    - d. Style 1..... 10. ESCALLONIA
    - dd. Styles 2..... 11. ITEA
  - cc. Fr. a fleshy berry..... 12. RIBES

**1. SAXIFRAGA**, L. SAXIFRAGE. About 400 species mostly in temp. and subarctic regions if the genus is accepted in its customary sense; some authors prefer to separate it into several genera. Many of the species are adapted to rock- and alpine-gardens and a few are planted in borders and one is common as a window- and basket-plant.—Herbs, a few annual and biennial, but mostly perennial with caudices below ground or little emerged: lvs. commonly basal and clustered, those on the st. usually alternate, the petioles without sheaths: infl. various, racemose, paniculate, cymose, or fls. sometimes essentially solitary; fls. bisexual, white, pink, purple, or yellow; calyx 5-parted, the base either free or adhering to ovary; petals commonly 5, entire; stamens 10; ovary usually 2-celled, making a 2-beaked caps., or sometimes the 2 carpels nearly separate. (*Saxifraga*: Latin *rock-breaking*, of disputed application.)—Aside from a few well-known species, saxifrages are fanciers' plants; many hybrids are recorded. The saxifrages are natives mostly in mts. and in rocky places.

Petals very unequal; plant extensively stoloniferous.....1. *S. sarmentosa*  
 Petals equal or essentially so.

Lf. narrow, not expanded at end.

Margin of lower lvs. serrate but not reflexed.....2. *S. aizoon*

Margin crenulate, reflexed.....3. *S. ligulata*

Lf. broad at end, cuneate-spatulate to obovate.

Margins and entire lf. very glabrous.....4. *S. cuneifolia*

Margins, at least toward base, ciliate.....5. *S. umbrosa*

1. *S. sarmentosa*, L. (*Sekika sarmentosa*, Moench). STRAWBERRY-GERANIUM. Perennial with running habit like a strawberry plant, loosely hairy: lvs. cordate-orbicular, very long-stalked from the crown, repand and somewhat crenate-dentate, upper surface veined white, lower surface reddish: scapes 6-24 in. high, bracted at the branches of the panicle; fls. many, white, 2 of the petals three to four times longer ( $\frac{1}{2}$  in. long) than the others and very acute. China, Japan; an old window and conservatory plant, and readily colonized in the milder regions.

2. *S. aizoon*, Jacq. (*Chondrosea aizoon*, Haw.). Cespitose perennial with erect bracted viscid scapes 3-20 in. high from dense rosettes on the ground, spreading by offsets: lvs. narrow-spatulate,  $\frac{1}{2}$ -1  $\frac{1}{4}$  in. long, obtuse or nearly so, serrate with incrustated white teeth: fls. in a narrow panicle at top of st. or scape, cream-colored more or less purplish-spotted, the obovate or elliptic petals much exceeding the calyx-lobes; late spring and summer. Alpine and boreal parts of north temp. zone; many forms are known and named in hort. literature.

3. *S. ligulata*, Bell. Cespitose perennial, producing scapes or sts. 6-12 in. high from branching dense rosettes, not viscid: lvs. linear-spatulate, narrower than in No. 2 and about the same length, the reflexed margins crenulate and incrustated: panicle usually beginning at middle or lower on st.; fls. white, the obtuse petals very prominent; late spring and summer. S. Eu.

4. *S. cuneifolia*, L. Little perennial 4-12 in. high when in bloom, somewhat cespitose: lvs. all basal, in loose rosettes, broad-spatulate or -obovate, very glaucous throughout, rounded at the end, long-tapering below, bluntly and evenly toothed, 1-1  $\frac{1}{2}$  in. long: scape very slender, branched in upper third or half, glabrous; fls. white, the obtuse little petals yellowish at base and sometimes purplish spotted; summer. Eu.

5. *S. umbrosa*, L. LONDON PRIDE. Much like No. 4 but lvs. not very glabrous and more or less hairy on margins, at least on and near the petiole: lvs. often white-margined: fls. white varying to pink; summer. Eu.; attractive low spreading plant.

2. **BERGENIA**, Moench (*Megasea*, Haw.). Often named in Saxifraga but distinct in habit and certain other characters: several Asian species, mostly in mts., with large thick rootstocks whereby the plants produce large clumps or colonies, thick, heavy, large, simple, waxy, more or less persistent, entire, toothed or crenate lvs. with short broad petioles sheathed or vaginate at base, the lvs. with gland-bearing pits: fls. large, pink or white, on scapes among the foliage. (*Berge-nia*: K. A. von Bergen, 1704-1760, German botanist.)—The species have been considerably hybridized. They are spring bloomers, the leafage rising 12-20 in.

Lvs. not ciliate on margin, mostly serrate.

Lf. orbicular-cordate.....1. *B. cordifolia*

Lf. obovate to long-obovate.....2. *B. crassifolia*

Lvs. ciliate on margin, entire.....3. *B. ligulata*

1. *B. cordifolia*, Sternb. Lvs. cordate-orbicular, fleshy, undulate-serrate, not ciliate, glabrous and shining, the petioles long and thick: fls. rose (vars. purple and white), in nodding clusters among the lvs.; calyx-lobes broad; petals roundish. Siberia.

2. *B. crassifolia*, Fritsch (*Saxifraga crassifolia*, L. *S. cuneifolia* and *S. sibirica*, Hort., not L.). Lvs. obovate to long-obovate, large and thick, the blades decurrent on petiole, undulate, slightly serrate or nearly entire but not ciliate, glabrous and shining: fls. rose, lilac or purple, in dense panicles standing above the lvs.; calyx-lobes oblong; petals elliptic-oblong. Siberia, Mongolia.

3. *B. ligulata*, Engl. (*Saxifraga ligulata*, Wall.). Lvs. large, obovate or orbicular, base tapering and sometimes cordate, margins scalloped or nearly entire and ciliate, glabrous above and beneath: fls. white, rose or purplish, nodding in racemes; calyx-lobes ovate, not narrowed at base; petals orbicular and clawed. Himalayas; many cult. forms have been named.



3. **ASTILBE**, Hamilt. (*Hoteia*, Morr. & Decne.). Perennial strong herbs, grown for the panicles of small white and pink fls.; species about 14, in Cent. and farther Asia, and 2 in E. U. S.—Lvs. 2-3-ternately compound, with broad dentate or incised lfts.: fls. mostly unisexual, plants dioecious or polygamous; calyx small, usually 4-5-parted; petals as many as calyx-lobes (sometimes absent), inserted at base of calyx; stamens of the same number or twice the number as the petals (mostly 8 or 10); pistils 2 or 3, distinct or variously united (when united, the caps. 2-3-celled): fr. of dehiscent follicles. (Astil-be: Greek *without sheen* or *not shining*, probably referring to lvs.)—Often confused with the herbaceous spirea group (*Aruncus* particularly), but those plants have many stamens and several to many separate pistils. The florists' astilbes are likely to be hybrids. The plants are sometimes forced under the name spirea.

Fls. white or essentially so.

Petals distinctly spatulate, broad and obtuse at end, about twice the length of the calyx.....

Petals very narrow, perhaps linear, three or four times length of calyx.....

Fls. decidedly pink or red.....

1. **A. japonica**, Gray. Erect, 1-3 ft., with scattered hairs on sts. and petioles, bearing many small white fls. in erect terminal and axillary panicles: lvs. 2-3-ternate; lfts. narrow, lanceolate or lance-ovate, acute, tapering to base, sharp-serrate: fls. upright, on hairy pedicels equaling or exceeding the bract, thinly disposed as ascending branches; calyx  $\frac{1}{2}$  in. or less long, closely subtended by narrow bracts, the lobes acute; petals about as long again as the calyx, spatulate, obtuse; stamens usually not prominent. Japan.—It runs into several cultivars, one with variegated and another with purple-tinted foliage; also with larger fls. and with more condensed panicle.

2. **A. astilboides**, Lemoine (*Spiræa astilboides*, Moore). Differs in having the divisions of the lvs. distinctly pinnate, lfts. ovate and not narrowed at base, infl. of dense spikes standing away from the axis (in fl.) at nearly right angles, petals narrower and longer, stamens more prominent. Japan.—Cult., and it enters into the parentage of **A. Lemoinei**, Lemoine, a race of garden hybrids, with very many white pink-stamened fls. in paniculate feather-like clusters. **A. Thunbergii**, Miq., has white fls. often changing to pink, in clusters on slender spikes combined to form a spreading panicle; lfts. ovate, serrate. Japan, sometimes planted. **A. chinensis**, Franch. & Sav., has white fls. in a narrow branchy panicle, and narrower doubly serrate lfts. China, and sometimes planted.

3. **A. Davidii**, Henry. Stout, 3-6 ft., hairy: primary divisions of lvs. pinnate, the lfts. ovate to broad-ovate and elm-like, coarsely serrate: infl. a long narrow panicle, to 2 ft., the branches densely fld. and ascending; fls. nearly sessile, rose-pink, several times longer than calyx and exceeding the dark blue anthers. (Armand David, French missionary, studied the plants and birds of China, collecting there 1862-1873.) China.—This species has entered into pink-fld. hybrids, as **A. rubella**, Lemoine, much like *A. Lemoinei* but fls. rose-colored. **A. Arendsii**, Arends, is a series of hybrids, with *Davidii* parentage on one side, the fls. ranging from purplish to nearly white.

4. **HEUCHERA**, L. Alum-Root. About 70 N. American perennial herbs, one now a common inhabitant of gardens.—Erect or ascending from a stout erect often branching stock, with the general habit of the saxifrages: lvs. mostly basal and long-petioled, broad and variously toothed or lobed: infl. on bracted or somewhat leafy peduncles from the stock, narrowly paniculate or racemose; fls. not large, but often showy, campanulate, urn-shaped or saucer-shaped, greenish, white, red, or purplish, the conspicuous part being the 5-lobed calyx; petals small, often shorter than calyx-lobes, spatulate, inserted on calyx; stamens 5, attached on petals; styles 2, slender; ovary 1-celled and many-ovuled: fr. a 2-valved dehiscent caps. (Heuche-ra: Johann Heinrich von Heucher, 1677-1747, German botanist.)—Several species have been more or less introduced to cult.

**H. sanguinea**, Engelm. CORAL BELLS. Attractive perennial, in spring and

summer, sending up slender scapes 10–20 in., branching near the top, the st. more or less glandular hairy: lvs. all basal, nearly orbicular with a cordate or somewhat truncate base, the blade 1–2 in. across, scalloped and dentate, petiole 3–5 in. long and hairy: fls. (calyx) bright red (in cult. sometimes whitish, pink, or crimson),  $\frac{3}{8}$ – $\frac{1}{2}$  in. long, bell-shaped, the lobes obtuse; petals narrow, shorter than calyx. New Mex., Ariz., and Mex., but hardy N.—It runs into many named hort. forms, as *Virginal*, nearly white; *Splendens*, dark crimson; *Gracillima*, a slender form. *H. brizoides*, Hort., said to be a hybrid with *Tiarella macrophylla*, is probably a variant of *H. sanguinea*, with many small fls. in an elongated narrow panicle.

5. **HYDRANGEA**, L. Species about 35 in N. and S. Amer. and Asia, some of them much prized ornamentals.—Woody plants, mostly self-standing shrubs but sometimes root-climbers or even tree-like: lvs. opposite, simple, petioled, without stipules: fls. white, pink, or blue, in terminal panicles or cymes, some of the marginal fls. usually enlarged and neutral, the expanded parts being the calyx, and in certain cult. races all the fls. thus modified; calyx-lobes and petals 4–5, the calyx-tube joined to ovary; petals valvate (edge to edge) in bud; styles short, 2–5: fr. a 2–5-celled many-seeded caps. dehiscent from the top. (Hydran-gea: Greek *water-vessel*, from shape of the capsule.)

Plants erect.

Lvs. not lobed.

Infl. pyramidal—long and narrowing upward.....1. *H. paniculata*

Infl. broad—flat or globular.

Styles usually 3; ovary partly superior so that the caps. has calyx-rim about the middle: lvs. mostly tapering into petiole.....2. *H. opuloides*

Styles usually 2; ovary inferior, so that caps. has lobes on top: lvs. rounded or cordate at base.

Under side of lvs. tomentose.....3. *H. radiata*

Under side glabrous except along veins.....4. *H. arborescens*

Lvs. strongly pinnately lobed.....5. *H. quercifolia*

Plants root-climbing.....6. *H. petiolaris*

1. ***H. paniculata***, Sieb. Shrub or tree-like, strong-growing, young parts lightly pubescent: lvs. elliptic to ovate,  $2\frac{1}{2}$ –5 in. long, rather abruptly short-pointed, narrowed or rounded at base and short-petioled, serrate, sparsely setose above, somewhat pubescent on veins beneath: fls. whitish, in a panicle 6–15 in. long, the sterile ones few and long-pedicelled and changing to purplish; styles 3: caps. about half inferior. China, Japan; frequent in cult.—Var. ***grandiflora***, Sieb., is the common outdoor hydrangea, with very large long panicles in which many or most of the fls. are sterile, large, persistent, and showy; cultigen.

2. ***H. opuloides***, Koch (*H. hortensis*, Sm. *H. Hortensia*, DC.). The greenhouse hydrangea and sometimes planted out; stout stiff shrub, 3–8 ft., glabrous except in infl.: lvs. large, elliptic to very broad-ovate, 3–8 in. long and often nearly as broad not counting the very abrupt short point, for the most part tapering into the petiole, coarsely toothed, light green, sometimes sparsely pubescent on veins beneath: fls. white, blush, or pink, sometimes becoming light blue, in large dense bractless flat or roundish cymes; ovary partly superior. China, Japan; summer, but grown to bloom under glass in winter.—The vars. in cult. are many, falling into two classes: the Japonica group (*H. japonica*, Sieb., and other names), bearing flat clusters with both sterile and fertile fls.; the Hortensia group (*H. Hortensia* vars.), bearing globose clusters with nearly all the fls. sterile, including Otaksa (*H. Otaksa*, Sieb. & Zucc.), Thomas Hogg, and others. There is also a Stellata group (*H. stellata*, Sieb. & Zucc.) with narrowly elliptic sepals borne on both sterile and fertile fls. There are races with variegated lvs.

3. ***H. radiata***, Walt. Strong shrub, 3–8 ft.: lvs. rather thick and leathery, oval to ovate to ovate-lanceolate, 2–5 in. long, acuminate, rounded or somewhat cordate at base, prominently serrate, bright green and glabrous above and white-tomentose beneath: infl. rounded, always with sterile fls. about the margin; petals apiculate. Mts. N. C. and S. C.; sometimes listed in catalogues.—A similar species, ***H. cinerea***, Small, probably sometimes cult. as *H. radiata*, has broader mostly obtuse thin lvs. gray-tomentose beneath and sterile fls. sometimes wanting; petals hooded at apex; mts. N. C. to Ala.

4. ***H. arborescens***, L. Erect strong shrub, 3–10 ft., the young parts lightly pubescent: lvs. ovate to broad-ovate, 3–6 in. long, tapering to point or abrupt, rounded or subcordate at base, strongly serrate, mostly becoming glabrous on both surfaces except on veins beneath: fls. white, in rounded or globular clusters,

the sterile ones few, many or sometimes none. N. Y. south and west.—Frequently planted, particularly in var. *grandiflora*, Rehd., with large clusters of clear white sterile fls., sometimes called "Hills of Snow."

5. *H. quercifolia*, Bartram. Strong shrub, 4–6 ft., with brown-tomentose young parts: lvs. large, 4–8 in. long and nearly or quite as broad, quadrangular-ovate in outline, strongly 3–5-lobed and the lobes denticulate, nearly or quite glabrous above and tomentose beneath: fls. in a somewhat elongated panicle, with many pink-white sterile fls. turning purple. Ky. south and often planted.

6. *H. petiolaris*, Sieb. & Zucc. Tall root-climber, reaching to 50 ft. and more but making a straggling partly decumbent bush when not provided with support; young parts sparingly pubescent: lvs. long-petioled, the nearly orbicular blade about 3–4 in. long, very abruptly pointed, subcordate at base, serrate, quite or nearly glabrous: fls. in large nearly circular open clusters, the white sterile fls. few on very long pedicels; petals cohering and falling as a cap; stamens 15; styles usually 2; ovary inferior. Japan.

6. **SCHIZOPHRAGMA**, Sieb. & Zucc. One root-climbing shrub in Japan and 2 in China, 1 in Formosa.—The genus differs from *Hydrangea* in the marginal sterile fls. comprising only 1 long-stalked unlobed sepal and style 1: fr. a small 10-ribbed caps.; valves with an inner layer divided into clustered fibers, whence the name *Schizophragma*, Greek *cleft wall*.

*S. hydrangeoides*, Sieb. & Zucc. Tall climber to 25–30 ft.: lvs. broad-ovate to nearly orbicular, 2¼–4 in. across, long-petioled, rounded, truncate or somewhat cordate at base, abruptly short-pointed, coarsely sharp-dentate, pale beneath: cymes 6–9 in. across, rather flat-topped; marginal calyx-lobe white, ovate, 1–1½ in. long, on a stalk of similar length; blooms in summer. Japan.—*S. integrifolium*, Oliver, a Chinese species, has ovate long-acuminate nearly or quite entire lvs. and narrower marginal calyx-lobes. *Hydrangea petiolaris* is sometimes confused with *Schizophragma*.

7. **DEUTZIA**, Thunb. Shrubs of E. Asia and the Himalaya region, about 50 species, some of them well-known as planted subjects.—Lvs. opposite, usually deciduous, petiolate, serrate, commonly with stellate pubescence, bearing white, blush, or purplish fls. profusely, mostly in panicles and racemes: fls. bisexual, with 5-lobed calyx and 5 usually valvate petals, the filaments usually winged and toothed; ovary inferior, with 2 or 3 distinct styles: fr. a 3–5-celled and -lobed more or less dehiscent caps. crowned by the insertion of the floral parts. (Deutzia: Johann van der Deutz, patron of Thunberg.)—The genus is rich in ornamental subjects, yet few species are in general cult.

Lvs. narrow,—on the lanceolate order,—glabrous or essentially so beneath: plant 3 ft. or less: fls. racemose, white.....1. *D. gracilis*

Lvs. broad,—on the ovate order,—pubescent or stellate beneath: plant larger: fls. white or blush.

Infl. long—in racemes sometimes aggregated into panicles; calyx-lobes usually deciduous from fr.....2. *D. scabra*

Infl. short—in corymbs or cymes; calyx-lobes persistent on fr.

Fls. white.....3. *D. parviflora*

Fls. pink or purple outside:.....4. *D. purpurascens*

1. *D. gracilis*, Sieb. & Zucc. Attractive little bush to 3 ft. high, the branches slender and wide-spreading or arching: lvs. lanceolate to oblong-lanceolate, 1½–2½ in. long, long-acuminate, finely sharp-serrate, usually with few stellate hairs above and none beneath: fls. pure white, in spring, in open simple or somewhat compound (paniculate) racemes; calyx-teeth persistent on fr.; petals ¼–¾ in. long, oblong, much exceeding stamens. Japan; common in cult.; there is a kind with yellowish and another with white-dotted lvs.

2. *D. scabra*, Thunb. Strong shrub, 5–6 ft., with many erect or ascending branches: lvs. ovate-lanceolate to ovate, acuminate, broad or rounded at base, crenate-dentate, scabrid-pubescent on both sides with stellate hairs: fls. white or blush, in late spring and summer, in loose usually somewhat compound racemes; calyx-lobes shorter than the tube, prevailingly deciduous on mature fr.; petals ⅜–½ in. long, often many (fls. double), slightly exceeding stamens or sometimes a little shorter. China, Japan.—The common deutzia of yards, known in many cultivars, as *crenata*, *Watereri*, *Fortunei*, *candidissima*, and others; *Deutzia* "Pride

of Rochester" belongs here; there is a var. with spotted lvs. *D. magnifica*, Rehd., is a hybrid race, with double white fls. in erect panicles, and calyx-lobes about as long as the tube.

3. *D. parviflora*, Bunge. Shrub to 6 ft., with many erect branches: lvs. ovate to oblong-ovate, 2-3 in. long, mostly narrowed at base, finely serrate, bearing stellate hairs on both sides: fls. rather small but numerous, white, in many-fld. corymbs suggesting *Aronia*; petals roundish-obovate, widely spreading, overlapping rather than valvate in the bud; longer filaments without teeth. China.—Of interest as one of the parents, with *D. gracilis*, of the hybrid race known as *D. Lemoinei*, Hort.; spreading shrubs to 3 ft., with elliptic-lanceolate finely appressed-serrate lvs. bearing few stellate hairs above and nearly glabrous beneath: fls. pure white, in large broad clusters; petals broad-ovate, spreading, partly valvate and partly overlapping; filaments with large teeth.

4. *D. purpurascens*, Rehd. Small shrub to 3 ft., with slender curving branches: lvs. ovate to ovate-lanceolate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, short-acuminate, mostly rounded at base, crenately unequally serrate, sparingly stellate-pubescent on both sides: fls. white inside and purplish outside, spreading, about  $\frac{3}{4}$  in. across, in 5–10-fld. corymbs; calyx-teeth equaling or exceeding the tube; inner stamens with petaloid filaments bearing the anther below the apex. China.—Of interest as being the parent, with *D. gracilis*, of a race of garden hybrids known as *D. rosea*, Rehd. (sometimes known also as *D. gracilis* var. *rosea*): small plants sometimes passing as *D. discolor* (not Hemsl.); lvs. ovate-oblong, very little stellate-pubescent on both surfaces: fls. pink, in panicles, but in some forms white and whitish; such varietal names as *campanulata*, *venusta*, *multiflora*, *carminea*, *eximea*, belong here.

8. **PHILADELPHUS**, L. **MOCK-ORANGE**. A confused genus horticulturally, of wide distribution, several in Asia, 1 species in Eu., 30 or more in U. S. and Mex., and many cultigens; popular in cult. for the showy white or somewhat colored bloom.—Erect shrubs with deciduous sometimes partially persistent foliage: lvs. opposite, simple: fls. white (unless otherwise noted) and often very fragrant, solitary, racemose or in clusters of few to a dozen or more; calyx-tube joined to ovary, the lobes and the petals 4–5, the latter convolute in bud; stamens many; styles mostly 4: fr. a dehiscent many-seeded caps., usually 2-parted and 4-valved. (Philadelphus: King Ptolemy Philadelphus, in the 3d century B. C.)—Sometimes called *Syringa*, but this name should be discontinued for *Philadelphus*. By variation and hybridizing, the specific lines have become obscured. Probably a number of the commonly separated species are not really distinct; some of the cult. Latin-named kinds may represent only asexual multiplication of a single plant. Other kinds than those here described may be found in special collections and some of them may come into commerce.

- A. Bark of last year's growths tight and close, not loosely peeling off (perhaps partial exception in No. 2).
- B. Calyx strongly pubescent outside.
  - c. Young twigs nearly or quite glabrous.
    - dd. Older branchlets with gray bark. . . . . 1. *P. pubescens*
    - dd. Older branchlets with red or chestnut-brown bark. . . . . 2. *P. verrucosus*
  - cc. Young twigs conspicuously gray-hairy. . . . . 3. *P. Karwinskianus*
- BB. Calyx essentially or completely glabrous outside although perhaps ciliate on margins. . . . . 4. *P. Gordonianus*
- AA. Bark of last year's growth brown and peeling off in thin papery flakes or plates (more or less exceptions in hybrids): calyx in most kinds glabrous or essentially so outside.
  - B. Fls. solitary or in clusters of 1–6 at tips of shoots and not racemose.
    - c. Lvs. thick, mostly less than 1 in. long, entire. . . . . 5. *P. microphyllus*
  - cc. Lvs. thin, usually exceeding 1 in. long, denticulate or dentate.
    - d. Lf.-blades on bearing shoots prevailing lance-ovate or broader. . . . . 6. *P. inodorus*
    - dd. Lf.-blades on bearing shoots narrower, mostly lanceolate. . . . . 7. *P. laxus*
- BB. Fls. in simple or sometimes compound racemes.
  - c. Pistils much surpassing the stamens, and deeply divided. . . . . 8. *P. Falconeri*
  - cc. Pistils little if at all exceeding the stamens, often much shorter.
    - d. A species, with cream-white very fragrant fls., short hairy pedicels, calyx-lobes glabrous except perhaps on edges, lvs. tapering at base. . . . . 9. *P. coronarius*



DD. A series of hybrids, without the foregoing combinations of characters but in many forms not clearly marked: fls. abundant, large and showy.

E. Pedicels glabrous.

F. Style equaling or surpassing stamens, divided one-half or less of its length; stigmas usually broad and prominent.....10. *P. Zeyheri*

FF. Style shorter than stamens, divided one-half or less its length and stigmas narrow.....11. *P. Lemoinei*

FFF. Style nearly or quite equal to stamens and divided to base; stigmas small.....12. *P. cymosus*

EE. Pedicels pubescent.

F. Fls. white; style shorter than stamens.

G. Style divided only at apex, stigmas small and connivent.....13. *P. polyanthus*

GG. Style divided to middle or below, the stigmas small....14. *P. virginalis*

FF. Fls. white with rose in center; style deeply divided.....15. *P. purpureo-maculatus*

1. *P. pubescens*, Loisel. (*P. latifolius*, Schrad.). Large shrub to 20 ft., the bark of last year's branches gray and not exfoliating, the twigs glabrous: lvs. broadly ovate to elliptic to ovate-lanceolate, 2-5 in. long or larger on very vigorous shoots, acute to acuminate, dentate or sometimes almost entire, pubescent beneath: fls. creamy-white, somewhat fragrant,  $1\frac{1}{2}$ -2 in. across, 5-10 in long leafy racemes; sepals pubescent outside. Tenn. and Ala.

2. *P. verrucosus*, Schrad. Probably hybrid: differs from No. 1 in bark of old branches purplish-red or chestnut-brown and of the younger branches somewhat lighter brown, sometimes tardily peeling.

3. *P. Karwinskyanus*, Koehne. Young twigs gray-hairy; branches somewhat sarmentose: lvs. more or less persistent, narrow-ovate, 2-2½ in. long, acute or acuminate, entire or denticulate, stiff-hairy both surfaces: fls. several to a dozen in a leafy terminal panicle on hairy pedicels; petals white, about twice length of stamens; calyx hairy; style divided to middle or more. Mex., named from collection made by Karwinsky; sometimes grown as *P. mexicanus* (not *P. mexicanus*, Schlecht.) and *P. sempervirens*.

4. *P. Gordonianus*, Lindl. Shrub with ascending branches, 9-12 ft., the bark of last year's growth gray and not exfoliating; lvs. ovate to elliptic,  $1\frac{1}{2}$ -3 in. long or to 4 in. on strong shoots, more or less acuminate, at base narrow or rounded and scarcely toothed but on young shoots subcordate and commonly many-toothed, 3-5-ribbed, pubescent both sides: fls. white, fragrant,  $1\frac{1}{2}$ -1¾ in. across, 5-9 in racemes terminating short branchlets that bear 2-4 pairs of lvs.; sepals lance-ovate and abruptly slender-pointed, nearly or quite glabrous outside; petals oblong to oval, sometimes retuse; styles united more than half their length. (Dedicated to George Gordon, of the Garden of the Horticultural Society, London.) Ida. to N. Calif. and B. C.—An old cult. plant, apparently often confused with No. 1. Var. *columbianus*, Rehd. (*P. columbianus*, Koehne), has smaller lvs. and fls., the lvs. on shoots bearing a few prominent coarse teeth; probably more cult. than the species. *P. Lewisii*, Pursh, from Mont: and Utah to Ore. and B. C., is in cult.: it differs in lvs. pubescent only on nerves beneath, entire or denticulate, and styles united about half their length.

5. *P. microphyllus*, Gray. Erect, 3-4 or 5 ft., with brown exfoliating bark on last year's growth: lvs. small,  $\frac{1}{2}$ -1 or sometimes  $1\frac{1}{4}$  in. long, oblong to oblong-ovate, more or less acute at both ends, somewhat 3-ribbed from base, entire, glabrous or with short hairs: fls. white, fragrant, opening 1-1½ in., borne 1-3 at the ends of branchlets that carry 2-4 pairs of lvs.; sepals ovate, mostly glabrous but sometimes scattered-hairy outside; petals obovate; styles united. S. Colo., New Mex., Ariz.; important as one of the parents of No. 11.

6. *P. inodorus*, L. Vigorous upright shrub, 5-10 ft., with exfoliating bark on last year's growth: lvs. broad-ovate to elliptic-ovate, 3-5 in. long, acute or short-acuminate, rounded or somewhat narrowed at base, entire or remotely dentate, 3-5-ribbed at base, glabrous or scattered-hairy above and hairy in axils of veins beneath: fls. white,  $1\frac{1}{2}$ -2 in. across, scentless, 1-3 (sometimes as many as 5), cymosely placed on branchlets that bear 1-3 pairs of lvs.; sepals ovate and acute; petals orbicular or nearly so; stigmas distinct; caps. obovoid, nearly or quite  $\frac{1}{2}$  in. long. N. C. south and west.—Var. *grandiflorus*, Gray (*P. grandiflorus*, Willd.). Upright or spreading shrub, 6-10 ft., with exfoliating brown bark, differing from the type in narrow more prominently toothed lvs., larger somewhat odorous fls., long-acuminate sepals, and larger caps. more tapering into the pedicel. Pa. south; the name is common in lists, but it may be applied to forms of No. 9 or others.

7. *P. laxus*, Schrad. Shrub to 8 ft.: lvs. often slightly recurved and sometimes pendulous, oblong-lanceolate to elliptic-ovate on young shoots, those on bearing shoots to 2 in. long and on young shoots to 3 or 4 in., sharp-acuminate, 2 side ribs prominent, slightly appressed-pubescent beneath, entire or sparingly denticulate: fls. solitary or in 3's (or 2's), 1-1½ in. across, scentless; style as long as stamens.—Var. *strigosus*, Rehd. (*P. strigosus*, Rydb.), has marked pubescence on under surface of lvs. Tenn., S. C., Ga., apparently rare but long known in cult.; it has been supposed to be of Chinese origin.

8. *P. Falconeri*, Sarg. Shrub to 8 ft.: lvs. firm, ovate-lanceolate and acuminate, to 3 in. long, denticulate, thinly hairy on veins beneath but otherwise glabrous, those on young shoots broad-ovate and dentate: fls. 3-7 on slender glabrous pedicels, 1½ in. across, pure white and fragrant, the petals oblong-acute; style deeply divided and much exceeding the stamens. Described from American nursery material that bore the name *P. Falconeri*, without history or origin; probably Japanese.

9. *P. coronarius*, L. The prevailing mock-orange of yards, grown under many forms and names: strong upright shrub to 10 ft. and more; bark on last year's twigs light brown and peeling off: lvs. ovate to ovate-elliptic or oval, 2-4 in. long, mostly tapering to either end, denticulate, glabrous above and lightly pubescent on veins beneath: fls. creamy-white, very fragrant, opening nearly or about 1½ in. across, borne 5-9 together in a raceme on flowering branches 2-6 in. long that bear 2 or 3 pairs of lvs.; sepals lance-ovate and acute; petals obovate, about ½ ¾ in. long; styles distinct all or part their length. Eu. and S. W. Asia; sometimes escaped in this country.—Var. *nanus*, Schrad., is a dwarf compact form. Other names belonging here are *dianthiflorus*, *rosæflorus*, *multiflorus plenus*, *salicifolius*. There are vars. with golden (var. *aureus*) and white-margined lvs.

10. *P. Zeyheri*, Schrad. Probably a hybrid of Nos. 9 and 6: a more spreading and lower bush than *P. coronarius*: lvs. ovate, 3-4 in. long, usually broad and rounded at base, acuminate, sharply denticulate or serrate, glabrous or with scattered hairs above, more or less hairy on veins and in axils beneath: fls. commonly 5, pure white, 1½-1¾ in. across, scentless or nearly so, on glabrous pedicels; calyx glabrous except on margins; style divided one-half or less its length, equaling or exceeding the stamens.—In several forms, all very floriferous and showy; *P. speciosissimus*, Hort., is one of the forms.

11. *P. Lemoinei*, Lemoine. Spreading or upright handsome shrub, issue of Nos. 9 and 5, usually 4 to 6 ft. tall; young branchlets pubescent or glabrous; bark of two-year-old branches chestnut-brown or red-brown, tardily peeling off in small thin flakes: lvs. of flowering branchlets ovate to elliptic-oblong, ¾-1½ in. long, acute or acuminate, rounded to cuneate at base, those of shoots ovate or broad-ovate, up to 2 in. long, distinctly acuminate and rounded at base, entire or with 1-4 small teeth on each side, glabrous above, sparingly strigose or glabrous or nearly so beneath: fls. 1-1¾ in. across, very fragrant, in rather dense 3-7-fld. racemes; pedicels ½-¾ in. long, glabrous like the pale calyx; stamens about half as long as petals; styles shorter than stamens, connate nearly to the apex or divided to about the middle; stigmas narrow. Here are placed the cultivars *Avalanche*, *Boule d'Argent*, *Candelabre*, *Mont Blanc*.

12. *P. cymosus*, Rehd. A Lemoinei hybrid, making an upright rather tall shrub; bark of two-year-old branchlets chestnut-brown and exfoliating, the young branchlets glabrous: lvs. elliptic-oblong to lanceolate, 2-3 in. long or longer on vigorous shoots, with 4-8 teeth on either side or sometimes only denticulate or even entire, glabrous above, hairy beneath and on veins: fls. white, 2 in. or more across, mostly in 3-9-fld. cymes (but sometimes fewer and racemose or even solitary), on slender bracted glabrous pedicels; calyx glabrous; styles divided to base, considerably shorter than the stamens or nearly equaling them, the stigmas small.—Here belong the garden names *Conquete*, *Mer de Glace*, *Norma*, *Perle Blanche*; fls. sometimes double.

13. *P. polyanthus*, Rehd. A Lemoinei hybrid, upright; bark of previous year chestnut-brown, tardily exfoliating, young branches sparingly pubescent: lvs. ovate, acuminate, rounded at base, 1-1½ in. long and twice that length on young shoots, remotely denticulate or entire, glabrous above and rather densely coarse-pubescent beneath, 3-nerved at base: fls. white, about 1½ in. across, in 7-9-fld. cymes or short panicles, on pubescent pedicels; calyx densely pubescent; style divided only at apex and shorter than stamens, the stigmas rather small and connivent.—The cultivar *Gerbe de Neige* is the type of this cultigen; *Favorite* is a form of it.

14. *P. virginialis*, Rehd. A Lemoinei, possibly *Polyanthus*, hybrid, making a

tall upright shrub; bark of last year's branches brown, exfoliating, the young branchlets glabrous: lvs. ovate and acuminate, at base rounded or broad-cuneate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long to more than 3 in. on strong shoots, dentate or denticulate, nearly glabrous above and villous-pubescent beneath: fls. white, double or semi-double, about 2 in. across, in 5–7-fld. racemes, on pubescent pedicels; calyx pubescent; style divided to middle or nearly to base, much shorter than stamens, stigmas small. —Cultivars Virginal, Glacier, Bouquet Blanc, Argentine, are placed here.

15. **P. purpureo-maculatus**, Lemoine (*P. phantasia*, A. H. Moore). Lemoinei hybrid, an upright bush; bark on young wood light shining brown, the shoots lightly pubescent toward top, on old wood exfoliating; lvs. lanceolate to ovate and acuminate, mostly broad at base,  $\frac{3}{4}$ –2 in. long on bearing shoots, to  $3\frac{1}{2}$  in. on strong shoots, variously denticulate to dentate and on short twigs nearly or quite entire, glabrous above, sparsely appressed-hairy beneath: fls. white tinted pale rose or rose-purple in center, fragrant, about  $1\frac{1}{2}$  in. across, the petals often with fringed margin, solitary, or few in a short compact cluster, on hairy pedicels; calyx glabrous except on edges; style deeply parted, nearly or quite equaling stamens, stigmas prominent. Here are placed cultivars Fantaisie, Étoile Rose, Romeo, Surprise, Sybille, Sirène, Nuage Rose.

9. **CARPENTERIA**, Torr. One evergreen shrub, native on the southern parts of the Sierra Nevada Mts., Calif., and planted in that state and somewhat elsewhere: differs from *Philadelphus* in the short styles being persistently united into 1 to the top, in the ovary superior, and other technical characters. (*Carpenteria*: Professor Carpenter, botanist of La.)

**C. californica**, Torr. Erect, 6–10 ft., branchlets strongly angled: lvs. opposite, thick, oblong to lanceolate, 2–4 in. long, margins entire and more or less revolute, narrowed to a short margined petiole, glaucous and very sparingly pubescent beneath: fls. white, 2–3 in. across, fragrant, single or few together, the peduncles long; sepals 5–7, becoming reflexed; petals 5–7, orbicular-obovate; stamens many with filiform filaments: caps. dehiscent, many-seeded.

10. **ESCALLONIA**, L. f. Fifty or more species, mostly evergreen shrubs and small trees, in the Andean region and S. Brazil to Argentina, some of which are introduced into the southern states and Calif. for ornament.—Lvs. alternate or clustered, simple, glandular-serrate or entire, exstipulate although the small side lvs. may be taken for stipules, often resinous-dotted: fls. white, pink, or red, fragrant, sometimes axillary but mostly in terminal racemes or panicles; calyx-lobes 5; petals 5, free but usually standing together as if forming a tube; stamens 5; style simple, the stigma 2–5-lobed and peltate or reniform; ovary inferior: fr. a top-shaped septicidal many-seeded caps. bearing the calyx-lobes and style at the top. (*Escallonia*: named after Escallon, a Spanish traveler in S. Amer.)—The Latin names of *Escallonia* are much misplaced in cult.

Twigs bearing prominent stalked glands: lvs. manifestly resinous-dotted beneath: fls. red.

Lvs.  $\frac{3}{4}$  in. or less broad, apex acute, tapering into a narrow base. . . . 1. *E. punctata*

Lvs. 1 in. or more broad, obtuse or nearly so, clearly short-petioled. . . 2. *E. macrantha*

Twigs smooth or bearing only few stalkless glands: lvs. smooth or only obscurely dotted beneath: fls. white.

Lvs. uniformly serrate: fls. in racemes or narrow pointed panicles . . . 3. *E. montevidensis*

Lvs. obscurely serrate or entire: fls. in heavy very compound usually broad and rounded panicles or thyrses. . . . . 4. *E. floribunda*

1. **E. punctata**, DC. Bushy shrub, 3–10 ft., the young branches brown and sticky with stalked glands: lvs. oval, elliptic-ovate or somewhat obovate, 1–2 in. long and  $\frac{3}{4}$  in. or less broad, tapering both ways, acute at apex, the base long-narrow but without distinct petiole, sharp-serrate on upper two-thirds, glabrous and glossy above, lighter-colored and resinous-dotted beneath: fls. dark red, mostly 2–4 together (sometimes 1) in a terminal infl. 1–3 in. long; calyx 5-angled, with spreading acute lobes, the base glandular; corolla cylindrical,  $\frac{1}{2}$  in. or less long and three or four times exceeding calyx, the veined obtuse tips revolute; style about equaling petals, the stigma peltate. Chile; sometimes grown as *E. sanguinea*.

2. **E. macrantha**, Hook. & Arn. Dense bush, mostly with stouter twigs than in No. 1 and pubescent with intermixed stalked glands: lvs. thick, broad-oval to

elliptic,  $1\frac{1}{2}$ -3 in. long and  $\frac{3}{4}$ - $1\frac{1}{2}$  in. broad, obtuse or very nearly so, variously contracted to a short distinct petiole, bluntly serrate, more or less lustrous above and prominently resinous-dotted beneath: fls. rose-red, in terminal racemes or small panicles 2-4 in. long which, however, are sometimes short, dense and as broad as long; calyx short, the tube glandular or viscid, lobes narrow and spreading; corolla much as in No. 1 but less tubular because the petals do not overlap. Chile; passes improperly under the names *E. organensis*, *E. rosea*, *E. rubra*.

3. *E. montevidensis*, DC. (*E. alba*, Hort.). Stout erect bush to 10 ft., with branches glabrous or bearing a few obsolescent stalkless glands on the youngest parts: lvs. barberry-like, elliptic-obovate to spatulate,  $1\frac{1}{2}$  in. long, rounded at apex, gradually tapering into short petiole, finely but prominently serrate, glabrous and shining but with obsolescent dots beneath: fls. white, about  $\frac{1}{2}$  in. long, in terminal and axillary racemes and narrow pointed panicles; calyx short, base glabrous or sparsely hairy, the small narrow lobes spreading; petals not overlapping to form a tube, the claws evident and two to three times longer than calyx, limb flaring to reflexed; stigma large, angled, prominent after anthesis. S. Brazil, Uruguay.—The names of this and No. 4 are frequently transposed.

4. *E. floribunda*, HBK. Very strong large bush or small tree: distinguished from No. 3 by longer and relatively narrower lvs. that are entire or obscurely serrate, and fls. in broad compound panicles or thyrses, the fls. shorter with claws of petals not much exceeding calyx, the limbs wide-spreading. Venezuela and Colombia south in the Andes.

11. *ITEA*, L. About a half-dozen shrubs and small trees, 1 in E. U. S. and the others in trop. and temp. Asia.—Lvs. alternate, simple, exstipular: fls. in simple terminal or axillary racemes, small but usually numerous, white; calyx with 5 persistent lobes, the base or tube joined to ovary; petals 5, very narrow, inflexed at tips; stamens 5, attached on disk; ovary partially or nearly superior, 2-celled, the style 2-grooved but becoming 2-parted, ovules few or many: fr. a narrow or conical septicidally 2-valved caps. (I-tea: Greek name of willow, applied probably from the resemblance of the lvs. of *I. virginica*, the original species.)

*I. virginica*, L. Shrub, 3-10 ft., the young growth finely pubescent: lvs. oval, oblong to oblanceolate, 1-3 in. long, short-pointed, narrowing into short petiole, minutely apiculate-serrate, glabrous above and lightly hairy on veins beneath: racemes of white fragrant fls. terminal, 2-6 in. long, in early and midsummer; petals linear, nearly  $\frac{1}{4}$  in. long, somewhat exceeding the stamens: fr. about  $\frac{1}{4}$  in. long including prominent style, standing upright on the raceme. Pa. and N. J. south; hardy farther north.—*I. ilicifolia*, Oliver, from Cent. China, with holly-like evergreen spiny lvs., has been introduced.

12. *RIBES*, L. CURRANTS and GOOSEBERRIES. Shrubs, about 150 species in temp. and cold regions in many parts of the world; some are cult. for the edible fr. and others for ornament.—Spiny or unarmed: lvs. alternate or fasciated, simple but usually palmately lobed, stipules none or else joined to petiole: fls. bisexual, or in some species the plants dioecious, 4-merous but usually 5-merous, solitary or in racemes, small but sometimes highly colored, the calyx being the showy part; calyx-tube short or long, adnate to ovary, lobes sometimes spreading; petals small or even minute (rarely absent), inserted on throat of calyx-tube; 5 stamens alternate with petals; ovary inferior, 1-celled but with 2 placenta; styles 2, separate or united into 1: fr. a many-seeded berry, crowned with remains of calyx. (Ri-bes: the Arabic name.)

A. The currants (*Ribes* proper): without spines at nodes: fls. mostly in racemes: fr. (in ours) glabrous.

B. Fls. short, saucer-like or open-campanulate, not highly colored: plants grown for fr. or habit, not for fls.

C. Lvs. resinous-dotted, strong-smelling. . . . . 1. *R. nigrum*

CC. Lvs. not so.

D. Racemes drooping; fls. bisexual.

E. Base of lvs. more or less cordate: anther-cells separated by broad connective. . . . . 2. *R. sativum*

EE. Base of lvs. usually truncate: anther-cells not separated. . . . . 3. *R. rubrum*



- DD. Racemes erect; plants dioecious. . . . . 4. *R. alpinum*  
 BB. Fls. tubular, red, yellow, white, and showy: cult. for bloom as well as for habit.  
 c. Color of fls. yellow.  
 d. Sepals less than half the length of calyx-tube. . . . . 5. *R. odoratum*  
 DD. Sepals more than half as long as tube. . . . . 6. *R. aureum*  
 CC. Color of fls. red, pink, or purple.  
 d. Calyx-tube shorter than lobes: style glabrous: fls. red. . . . . 7. *R. sanguineum*  
 DD. Calyx-tube longer than lobes: style hairy: fls. pink or purple. . . . . 8. *R. malvaceum*  
 AA. The gooseberries (*Grossularia*): with spines at nodes: fls. usually 1-4; fr. bristly or spiny.  
 B. Fls. greenish, 5-merous: grown for the edible fr.  
 c. Lvs. prevailing cuneate at base: ovary glabrous. . . . . 9. *R. hirtellum*  
 CC. Lvs. prevailing subcordate or broad at base: ovary villous. . . . . 10. *R. Grossularia*  
 BB. Fls. greenish-red, 5-merous: grown for ornament. . . . . 11. *R. hesperium*  
 BBB. Fls. bright red, 4-merous: ornament. . . . . 12. *R. speciosum*

1. *R. nigrum*, L. BLACK CURRANT. Stout bush, 4-6 ft., with blackish old wood bearing large lenticles, the plant emitting strong odor: lvs. broad-triangular to nearly orbicular in outline, 3-5-lobed, middle lobe pointed, subcordate to cordate, irregularly serrate, nearly or quite glabrous, resinous-dotted beneath: fls. 5-10 in small-bracted racemes, greenish-white; calyx-tube bell-shaped, more or less pubescent; petals about half length of sepals: berry nearly globular, black. Eu., Asia, planted for its aromatic frs. which are used in cookery and preserves; there are green-fruited and yellow-fruited kinds and also cut-leaved and variegated forms grown for interest and ornament.

2. *R. sativum*, Syme (*R. vulgare*, Lam.). COMMON CURRANT. Familiar upright shrub, 4-6 ft., but kept lower in good cult., the young growth pubescent: lvs. triangular-ovate or sometimes broader than long, 3-5-lobed, 2-3 in. across, variously cordate at base, dentate and cut, pubescent beneath at least on veins: fls. greenish-yellow in several to many-fld. drooping racemes, the pedicels villous; calyx-tube with an elevated 5-angled ring inside between the stamens and style and this region purplish; anther-cells separated by a broad connective: fr. red ("red currants") or white ("white currants"), sometimes striped. W. Eu.—Var. *macrocarpum*, Bailey. CHERRY CURRANT. Lvs. large, 3-lobed, prominently cordate: fr. large, red: plant usually less hardy.

3. *R. rubrum*, L. This and No. 2 are usually not separated, but there are apparently two species more or less concerned in the origin of the garden currants. The currants grown in this country are probably all *R. sativum*; in N. Eu. some of them are apparently *R. rubrum*; perhaps some of our small-fruited very hardy kinds are hybrids of the two species. In *R. rubrum* the young growths, as also the lvs., are quite or nearly glabrous: lvs. larger, truncate or only subcordate: racemes more spreading than drooping, the pedicels short; calyx-tube without the ring and the purplish color; anther-cells not separated: fr. small. Cent. and N. Eu. and N. Asia.—*R. triste*, Pall., native in woods and boggy places in northern part of N. Amer. and in Asia, formerly considered to be *R. rubrum*, is a sprawling or decumbent rather than erect bush, pedicels usually glandular, calyx brownish or purplish, anther-cells not separated: not a hort. plant.

4. *R. alpinum*, L. MOUNTAIN CURRANT. Dioecious spreading dense shrub, 6-8 ft., growths whitish and glabrous: lvs. broad- or triangular-ovate, 1-2 in. across, mostly 3-lobed, base truncate or subcordate, glabrous, irregularly dentate: fls. small, greenish, borne profusely in upright racemes; calyx-tube nearly flat, the lobes ovate; petals minute: fr. scarlet, persisting long. Eu.; an old garden ornamental, in several forms.

5. *R. odoratum*, Wendl. (*R. fragrans*, Lodd. *Chrysobotrya odorata*, Rydb.). MISSOURI or BUFFALO CURRANT. Shrub, 5-7 ft., with pubescent young branches: lvs. ovate to orbicular-reniform in outline, 1-3 in. broad, deeply 3-5-lobed, cuneate or truncate at base, coarsely dentate, becoming glabrous: fls. in 5-8-fld. pubescent racemes, yellow, fragrant; calyx-tube about  $\frac{1}{2}$  in. long, the lobes reflexed or widely spreading and scarcely half as long as the tube; petals nearly half as long as calyx-lobes, reddish: fr. black, nearly or quite globose, about  $\frac{1}{2}$  in. diam. Great Plains plant, S. D. to Tex., east of the Rocky Mts.; sometimes escaped from cult.; planted for its fragrant yellow fls.; the Crandall currant, grown for its fr., belongs here.

6. *R. aureum*, Pursh (*R. tenuiflorum*, Lindl. *Chrysobotrya aurea*, Rydb.). To this species *R. odoratum* has been referred, but recent authors consider that there are two species, *R. aureum* occurring in the Rocky Mts. and westward: it is a smaller and more slender bush than No. 5: lvs. often subcordate at base and slightly crenate-dentate: fls. usually more numerous in the raceme and smaller, less fragrant;

calyx-tube somewhat shorter and more slender, the lobes more than half its length and the limb spreading; petals shorter: fr. black, red, or yellowish, usually smaller. Some of the stock in cult. may represent this species.

7. *R. sanguineum*, Pursh. Shrub to 10 ft., the young growth pubescent and usually somewhat glandular: lvs. triangular-ovate to reniform-orbicular,  $1\frac{1}{2}$ –3 in. broad, obtusely 3–5-lobed, margins serrate to nearly entire, dull green and nearly or quite glabrous above, soft-pubescent beneath: fls. red or crimson, in several to many-fl. racemes with prominent colored bracts, calyx and pedicels glandular-pubescent, in early spring; calyx-tube about  $\frac{1}{2}$  in. long and exceeded by the lobes: fr. blue-black, glaucous, mostly somewhat glandular. N. Calif. to B. C.; an old ornamental plant; there are color vars.—*R. Gordonianum*, Lem., is a hybrid between *R. sanguineum* and *R. odoratum*, often planted: habit of *R. odoratum*, but fls. yellow tinged red outside and somewhat glandular: lvs. glabrous, truncate, usually 3-lobed, less pubescent than those of *R. sanguineum*.

8. *R. malvaceum*, Sm. (*R. sanguineum* var. *malvaceum*, Loud.). Compact grower, 4–6 ft.; young growth glandular-pubescent: lvs. thick and rugose, ovate-orbicular to nearly orbicular, 1–2 in. across, 3–5-lobed, serrate, setose-hairy and glandular above, grayish-tomentose beneath: fls. pink or purple, in drooping several-fl. racemes with colored caducous bracts, the pubescent calyx-tube longer than the obtuse limbs; ovary white-pubescent: fr. viscid-pubescent. Middle Calif. and S.; branches stouter and more strict than in No. 7.

9. *R. hirtellum*, Michx. Erect bush, 2–4 ft., the branches usually unarmed but often bristly: lvs. nearly orbicular to broad-ovate, 1–2 in. broad, 3–5-lobed, mostly narrowed or cuneate at base, very sharp-dentate, glabrous or nearly so, petioles often long-hairy, not glandular: fls. 1–3 together, small and greenish or purple-tinged, with bracts much shorter than pedicels, the peduncles not exceeding petioles; calyx-tube glabrous or lightly hairy, about the length of the lobes; stamens much longer than the petals: fr. usually glabrous, purple or black at maturity,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam. Pa. and W. Va., north and northwest; supposed source of the American pomological gooseberries, either by direct amelioration or by hybridity with *R. Grossularia*, or both.—Formerly included in *R. oxyacanthoides*, L., another native species, but now usually separated although the distinctions are not clear; *R. oxyacanthoides* is generally spine-bearing and more bristly, lvs. mostly obtusely toothed, stamens about equaling the petals, and other minor characters.

10. *R. Grossularia*, L. (*Grossularia reclinata*, Mill.). ENGLISH GOOSEBERRY. Stockier stiffer plant than No. 9, about 3 ft., with ascending or reclining branches and stout spines mostly in 3's, sts. sometimes bristly: lvs. stiffish, nearly orbicular, 1–2½ in. broad, cordate or somewhat tapering at base, 3–5-lobed with lobes obtuse or indifferently acute, margins toothed and somewhat revolute, glabrous or pubescent: fls. 1 or 2 on nodding peduncles, greenish; calyx-tube pubescent, about as long as the lobes; ovary pubescent and often glandular: fr. usually pubescent and glandular. Eu., N. Afr., S. W. Asia, sometimes escaped in this country.—Var. *Uva-crispa*, Sm. (*R. Uva-crispa*, L.), has smaller pubescent lvs., pubescent not glandular ovary, and small yellowish pubescent fr.

11. *R. hesperium*, McClatchie. Large shrub to 10 ft., with smooth branches without bristles but bearing long spines: lvs. nearly orbicular in outline, 1–1½ in. broad, 3–5-lobed, commonly truncate at base, crenate-dentate, puberulent on both sides, sometimes minutely glandular beneath: fls. 1 or 2, greenish-red; calyx-tube puberulent, less than half the length of the narrow-lanceolate lobes: fr.  $\frac{1}{2}$  in. or less diam., very prickly. S. Calif., and sometimes planted in that state.

12. *R. speciosum*, Pursh. FUCHSIA-FLOWERED GOOSEBERRY. Attractive ever-green stout shrub to 10–12 ft., bristly and with long stout spines: lvs. thick, obovate, oblong to orbicular, 1½ in. or less long, few-toothed or sometimes 3–5-lobed, shining above, glabrous or only sparingly glandular-hairy: fls. 2–4, bright red, tubular, with long-exserted stamens, hanging on slender peduncles: fr. ovoid, red, glandular-bristly. Calif.

### 73. PITTOSPORACEÆ. PITTOSPORUM FAMILY

Trees and shrubs, often climbing, of 9 genera and about 150 species, mostly native in Australia but Pittosporum distributed over the tropics of the Old World; the family yields ornamental subjects.—Lvs. alternate, simple, usually leathery, exstipulate: fls. bisexual or rarely unisexual, regular or slightly oblique, the infl. various; sepals 5, distinct or rarely united at base, imbricated; petals 5, hypogynous, the claws often connivent or coherent; stamens 5, hypogynous,

free, alternating with petals; ovary superior, sessile or shortly stalked, composed of 2, rarely 3-5, carpels, with few or many ovules on parietal placenta; style simple, with terminal stigma entire or minutely lobed: fr. a loculicidally dehiscent caps. or an indehiscent berry-like body.

Plant an erect tree or shrub.....*f. 1. PITTOSPORUM*  
Plant a climbing subshrub.....*2. SOLLYA*

**1. PITTOSPORUM**, Banks. Nearly 100 species of evergreen trees and shrubs widely distributed in trop. regions of the Old World, chiefly in the southern hemisphere, many grown for ornament in warm countries and sometimes under glass.—Lvs. entire or sinuate-dentate, often apparently whorled on the young growths: fls. in terminal panicles or clusters, or solitary and terminal or axillary; petals coherent or connivent at base or to nearly the middle, rarely spreading from base; ovary incompletely 2-celled, rarely 3-5-celled, style short; ovules few to many, sometimes failing by abortion: fr. a globose, ovate, or obovate caps., often compressed laterally, with 2 to many seeds, the valves leathery or woody. (*Pittosporum*: from Greek for *pitch* and *seed*, referring to the resinous coating of the seeds.)

Fls. dark red or purple.  
Lvs. densely white-pubescent beneath.....*1. P. crassifolium*  
Lvs. glabrous beneath.....*2. P. tenuifolium*  
Fls. white, greenish, or yellow.  
Lvs. obtuse, very thick and leathery.  
Petals almost  $\frac{1}{2}$  in. long.....*3. P. Tobira*  
Petals  $\frac{1}{4}$  in. or less long.....*4. P. viridiflorum*  
Lvs. acute, rather thin.  
Fls. axillary: lvs. linear.....*5. P. phyllæroides*  
Fls. in terminal clusters: lvs. lanceolate or broader.  
Shape of lvs. rhomboid, margins coarsely toothed.....*6. P. rhombifolium*  
Shape of lvs. oval-oblong to lanceolate, margins undulate.  
Petals about  $\frac{1}{2}$  in. long.....*7. P. undulatum*  
Petals less than  $\frac{1}{4}$  in. long.....*8. P. eugenioides*

**1. P. crassifolium**, A. Cunn. KARO. Tall shrub or small tree from 15-30 ft. high, useful for windbreaks near the sea: branchlets, under surface of lvs., petioles, and infl. densely white-tomentose: lvs. to 3 in. long, obovate or oblong, narrowed to short thick petiole, obtuse, leathery, dark green above and downy beneath, the margins revolute: fls. in terminal clusters; petals almost  $\frac{1}{2}$  in. long, twice as long as sepals, dark red or purple: caps. large,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long, subglobose, tomentose, dehiscent into 3 or 4 thick woody valves. New Zeal.—*P. Ralphii*, Kirk, seems sometimes to be grown as *P. crassifolium*, but the lvs. are flat on the margins and the fr. smaller.

**2. P. tenuifolium**, Gaertn. Shrub or tree from 20-40 ft. high, of symmetrical and compact growth, useful for hedges and mass planting: lvs. to 3 in. long, oblong to elliptic-obovate, obtuse or acute, margins undulate, thin, dark green, glabrous and lustrous when mature: fls. solitary in the lf.-axils, rarely fascicled,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, dark purple: caps. globose,  $\frac{1}{2}$  in. diam., 3-valved. New Zeal.

**3. P. Tobira**, Ait. JAPANESE PITTOSPORUM. A winter-flowering shrub to 10 ft. high, very attractive in shrubberies, and grown as a house-plant in the N.: lvs. very thick and leathery, obovate, very obtuse, 2-4 in. long, glabrous, margins revolute: fls. in terminal umbels, fragrant, white or greenish, nearly  $\frac{1}{2}$  in. long: fr. ovoid,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, angled, densely short-hairy. (*Tobira*: native Japanese name.) China, Japan.—There is a var. with lvs. variegated white.

**4. P. viridiflorum**, Sims. CAPE PITTOSPORUM. Closely resembling the above, but a tree-like shrub to 25 ft.: fls. smaller,  $\frac{1}{4}$  in. or less long, greenish or yellowish, in dense compound clusters: fr. subglobose, about  $\frac{1}{4}$  in. long. S. Afr.

**5. P. phyllæroides**, DC. NARROW-LEAVED PITTOSPORUM. A graceful glabrous tree to 20 ft. or more, with pendent twigs: lvs. oblong- to linear-lanceolate, 2-4 in. long, with a small hooked point, entire: fls. axillary, pedicelled, yellow, about  $\frac{1}{2}$  in. long: fr. oval, about  $\frac{1}{2}$  in. long, compressed, deep yellow. Deserts of Australia.

**6. P. rhombifolium**, A. Cunn. QUEENSLAND PITTOSPORUM. A glabrous pyramidal tree to 80 ft. high, often planted for avenues: lvs. rhomboid-oval or rarely broadly oblong-lanceolate, 3-4 in. long, abruptly acuminate, narrowed into petiole  $\frac{1}{2}$ -1 in. long, coarsely toothed from the middle upward: fls. white, numerous, in

terminal compound corymbs, about  $\frac{1}{4}$  in. long: fr. nearly globose, about  $\frac{1}{4}$  in. long, becoming bright orange-yellow and persisting through the winter. Australia.

7. *P. undulatum*, Vent. VICTORIAN-BOX. Tree to 40 ft. and more but often pruned as a shrub, suitable for hedges and avenues: lvs. oval-oblong to lanceolate, 3-6 in. long, acuminate, petioles  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, deep green and shining, entire, margins usually undulate, often crowded near the ends of the branchlets: fls. white, very fragrant, in terminal few-fl. clusters, almost  $\frac{1}{2}$  in. long: fr. nearly globose, smooth, nearly  $\frac{1}{2}$  in. long. Australia.—Sometimes called "mock orange."

8. *P. eugenioides*, A. Cunn. TARATA. Small round-headed tree to 40 ft., with pale bark, often planted for hedges and shrubberies: lvs. elliptic-oblong, acute, 2-4 in. long, the margins usually undulate: fls. greenish-yellow, numerous, in terminal compound umbels, less than  $\frac{1}{4}$  in. long: fr. ovoid, acute, about  $\frac{1}{4}$  in. long. New Zeal.

2. *SOLLYA*, Lindl. About 3 species of evergreen climbing subshrubs native in Australia, one of which is grown in the S. as covering for banks, fences, and the like, and sometimes in greenhouses N.—Lvs. narrow, entire or rarely sinuate: fls. nodding, blue, in terminal loose few-fl. cymes, rarely solitary; sepals small, distinct; petals spreading from the base, obovate; anthers longer than the filaments, connivent in a cone around the ovary; ovary 2- or 4-celled, style short: fr. an oblong indehiscent many-seeded caps., becoming more or less baccate. (Sol-lya: after Richard Horsman Solly, 1778-1858, English botanist.)

*S. heterophylla*, Lindl. AUSTRALIAN BLUEBELL CREEPER. Small shrub to 6 ft. high, with slender twining sts.: lvs. varying from ovate-lanceolate to oblong-linear, 1-2 in. long, obtuse or slightly acuminate, usually narrowed into a very short petiole: cymes mostly 4-8-fl., the fls.  $\frac{1}{3}$ - $\frac{1}{2}$  in. long: caps.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, pubescent. W. Australia.

#### 74. HAMAMELIDACEÆ. WITCH-HAZEL FAMILY

About 20 genera and 50 species of trees and shrubs, native in subtrop. or warm temp. regions of Asia, S. Afr., and N. Amer., sometimes planted as ornamentals.—Lvs. usually alternate, petioled, simple or palmately-lobed, entire or serrate, stipulate: fls. bisexual, polygamous, or monœcious, in heads or spikes; calyx-tube more or less adnate to ovary, the limb truncate or 4-5-lobed; petals 4-5, inserted on calyx, or 0; stamens 4 to many, perigynous; ovary inferior or nearly so, of 2 carpels united below, with 1 or several ovules in each carpel, and 2 styles: fr. a 2-celled, 2-beaked woody caps. dehiscent at the summit, with usually only 1 or 2 fertile seeds in each cell.—The Sweet Gum, *Liquidambar Styraciflua*, L., native from Conn. to Fla. and Tex., may be planted; it is a tall pyramidal tree with 5-7-lobed maple-like lvs. and usually corky branches, and hanging spinose balls of fr.

|                       |               |
|-----------------------|---------------|
| Fls. in clusters..... | 1. HAMAMELIS  |
| Fls. in racemes.....  | 2. CORYLOPSIS |

1. *HAMAMELIS*, L. WITCH-HAZEL. Deciduous trees or shrubs, of about 6 species native in E. N. Amer. and China and Japan, grown for their yellow fls. which bloom in autumn and winter.—Bark scaly: buds naked: lvs. straight-veined, unequal at base, sinuate-dentate, stipules deciduous: fls. bisexual, in short-peduncled, nodding, axillary, few-fl. clusters; calyx 4-parted; petals 4, strap-shaped, crumpled, bright yellow; stamens 4, very short, alternating with 4 scale-like staminodes; ovule solitary: fr. ripening the summer or autumn following the fls., usually 2 from each fl.-cluster, with 2 shining black seeds which are forcibly discharged when ripe. (Hamame-lis: old Greek name, *together* and *apple*, the fls. and fr. being produced at the same time.)—The native *H. virginiana*, L., may sometimes be transferred to grounds;



it is distinguished by its glabrous lvs., autumnal fls., and calyx brownish-yellow inside.

Lvs. glabrous below, pubescent only when young.....1. *H. japonica*  
Lvs. densely pubescent below.....2. *H. mollis*

1. *H. japonica*, Sieb. & Zucc. Shrub or small tree to 30 ft. high: lvs. roundish to oblong-ovate or obovate, 2-4 in. long, prominently veined beneath, glabrous, or pubescent only when young: calyx-lobes revolute, purplish or yellow inside; petals  $\frac{3}{4}$  in. long; ovary about three-fourths superior: fr. surrounded at base only by calyx. Japan.—Var. *Zuccariniana*, Arb. Kew., has smaller fls. which open about three weeks later. (Named after J. G. Zuccarini, 1797-1848, German botanist.)

2. *H. mollis*, Oliver. Differs from the above in its orbicular-obovate or obovate-oblong cuspidate lvs. which are densely pubescent beneath, the calyx purplish-red inside and the ovary nearly one-half superior. Cent. China.

2. *CORYLOPSIS*, Sieb. & Zucc. About 12 species of deciduous shrubs, native in E. Asia and Himalayas.—Lvs. prominently veined, dentate, with linear-lanceolate caducous stipules: fls. yellow, appearing before the lvs., in nodding racemes which have large bracts at the base; calyx-tube adnate to ovary, the limb short and 5-parted; petals 5, clawed; stamens 5, alternating with entire or 2-3-parted short staminodes; ovary half superior: caps. with 2 shining black seeds. (*Corylop-sis*: *Corylus* and *opsis*, like; resembling the hazel in foliage.)

*C. spicata*, Sieb. & Zucc. Shrub to 4 ft. high; young branchlets pubescent: lvs. roundish-ovate or obovate, 2-4 in. long, oblique and rounded or cordate at base, glaucous and pubescent beneath: racemes 1-2 in. long, 7-10-fl., with ovate bracts; calyx hairy; petals obovate, shorter than stamens. Japan.

## 75. PLATANACEÆ. PLANE-TREE FAMILY

One genus of large monœcious trees, about a half-dozen species in S. E. Eu. to India, and in N. Amer. south to Cent. Amer.—Bark of the branches exfoliating in plates rather than separating in ridges and furrows but at the base of old trunks becoming furrowed: young shoots and unfolding lvs. rusty-tomentose: lvs. large and broad, palmately ribbed and lobed, petiole enlarging at base and covering the bud, stipules conspicuous and joined into a tube with lf.-like margin: fls. unisexual, in dense globular peduncled separate heads; sepals, petals, stamens, and pistils 3-8, the floral envelopes not conspicuous; styles elongated beyond the head: the head in fr. is enlarged and hard but the frs. not coherent, each fr. an obconical 1-seeded nutlet surrounded at base by long hairs.

**PLATANUS**, L. PLANE-TREE. Characters of the family; forest and street trees in N. Amer., conspicuous because of the white branches more or less mottled with patches of gray, the wide-spreading arm-like branches and eventually the great flanging bole. The fr.-heads, on long peduncles, hang in winter; fls. in spring. (Plat-anus: ancient Greek name of the plane-tree.)

Fr.-head 1 to a peduncle, rarely 2: lvs. with usually 3 triangular lobes....1. *P. occidentalis*  
Fr.-heads 3 or more: lvs. with 5-7 narrow ascending more or less finger-like lobes.....2. *P. orientalis*

Fr.-heads mostly 2 or 3: lvs. usually triangular-lobed but more deeply than in No. 1: hybrid.....3. *P. acerifolia*

1. *P. occidentalis*, L. The native plane-tree or buttonwood of the northeastern states, infrequently planted, and seriously attacked by blight (*Gnomonia veneta*): it becomes an immense tree: it is known from other planes by its peduncles commonly bearing but 1 head from which the styles do not prominently project: lvs. as broad as long or even broader, truncate or cordate at base, 3- or rarely 5-lobed and lobes broader than long, the margins with few to several large angular teeth: sometimes but erroneously called sycamore (that name belongs to *Ficus Sycamorus*).

2. *P. orientalis*, L. Native in S. E. Eu. to India, little if at all known in this

country although the name is frequently used, being misapplied to No. 3: lvs. less broad at base than No. 1, being usually more or less cuneate, the blades cut one-half or more their depth into narrow sinuses separating 5-7 long and narrow upstanding lobes: fr.-heads 3-5, bristly from the very long curving styles; there are several lf. forms.

3. *P. acerifolia*, Willd. LONDON PLANE, and the common platanus of streets in this country, little damaged by leaf-blight, supposed hybrid between Nos. 1 and 2 and showing considerable lf. variation but always approaching the triangular lobing and broad open angles of No. 1, generally distinguished by the long middle lobe which is as long as broad or slightly longer: fr.-heads usually 2 but sometimes 3 and 4, the styles prominent but not so much so as in No. 2: makes a large tree, rapid-growing and hardy: several of the lf. forms have been named abroad as species.

## 76. ROSACEÆ. ROSE FAMILY

As customarily accepted, perhaps 2,500 species and about 100 genera comprise the rose family, in which are some of the major ornamental and pomological plants; it is a somewhat heterogeneous family and yet it holds together by combinations of distinctive characters that fairly distinguish it from related families; the typical rose flower looks like a typical buttercup flower but it is perigynous (ovaries inferior or in the calyx-tube), has a disk, and the stamens are in whorls or cycles; from the saxifrage family it is known by its numerous stamens in cycles, carpels usually more numerous, seeds mostly not albuminous.—Herbs, shrubs, small trees, spiny or unarmed, sometimes climbing, largely of temp. regions: lvs. usually alternate and stipular, but the stipules sometimes caducous: fls. mostly bisexual and regular, in many colors, but white, pink, and rose predominating, the envelopes borne on the edges (perigynous) of a hypanthium or calyx-tube that is lined or rimmed with a glandular disk; sepals or calyx-lobes 4-5, and petals of same number or seldom wanting; stamens commonly numerous (but sometimes definite), in whorls or cycles of 5, perigynous; carpels few to many, 1- to several-ovuled, the styles as many as the carpels: fr. various, sometimes an achene, sometimes a follicle, hip, pome, or drupe; seeds usually exalbuminous.—The receptacle or hypanthium assumes various forms: in the rose it is hollow and bears the pistils (which become achenes) on the inside, forming a hip; in the strawberry it is much enlarged and fleshy, forming the "berry" on the outside of which the achenes or true fruits (usually called "seeds") are borne; in the raspberry it is the cone that remains on the bush when the cluster of drupelets is picked; in the blackberry it is the core to which the drupelets adhere; in the apple and pear (which are pomes) it is the fleshy part of the fr. outside the core. In the plum tribes the ovary is superior and forms a drupe without attachment of hypanthium. Many of the species in this family run into numberless cultivars. *B, Bb, C, D*, Fig. 10, page 387.

- a. Ovary or ovaries superior: fr. not a pome.
  - B 1. Fr. an achene, inclosed in a hollow, tubular, globular or urn-shaped receptacle (hypanthium or calyx-tube).
    - c. Pistils (and frs.) many: receptacle becoming fleshy and berry-like: petals showy..... 1. *ROSA*
    - cc. Pistils 1-4: receptacle dry and caps.-like: petals absent: ours herbaceous.
      - d. Calyx subtended by 5 or 6 bractlets..... 2. *ALCHEMILLA*
      - dd. Calyx bractless..... 3. *SANGUISORBA*
  - B 2. Fr. an achene (or achene-like caps. in No. 7) but not inclosed in a calyx-tube or hypanthium.
    - c. Lvs. simple: pistils 2-5 (perhaps to 8 in No. 4).
      - d. Individual fls. showy, few or solitary.
        - e. Fls. yellow: lvs. alternate..... 4. *KERRIA*
        - ee. Fls. white: lvs. opposite..... 5. *RHODOTYPOS*
      - dd. Individual fls. very small, in a large showy panicle..... 6. *HOLODISCUS*
    - cc. Lvs. compound: pistils 5 or more, usually many.
      - d. Calyx bractless: carpels 5-15; ovules 2..... 7. *FILIPENDULA*

# ROSACEÆ

- DD. Calyx subtended by bractlets: carpels many; ovule 1.
  - E. Style elongating in fr., often becoming plumose..... 8. GEUM
  - EE. Style not elongating, deciduous.
    - F. Receptacle not fleshy or enlarged in fr..... 9. POTENTILLA
    - FF. Receptacle much enlarged in fr.
      - G. And very fleshy..... 10. FRAGARIA
      - GG. And not fleshy..... 11. DUCHESNEA
- B 3. Fr. a fleshy achene or drupelet, like a seed, often several or many combined to form an aggregate fr.
  - C. Drupelets separate: plants not thorny.
    - D. Fls. yellow: lvs. alternate..... 4. KERRIA
    - DD. Fls. white: lvs. opposite..... 5. RHODOTYPOS
  - CC. Drupelets combined into 1 body: plants mostly thorny..... 12. RUBUS
- B 4. Fr. a dehiscent follicle.
  - C. Seeds flattened and winged: individual fls. 1 in. or more across..... 13. EXOCHORDA
  - CC. Seeds not flattened: individual fls. small but in showy clusters.
    - D. Pistils opposite the petals, or less in number than the petals.
      - E. Lvs. simple, rarely as much as pinnatifid: shrubs and sub-shrubs.
        - F. Fls. with a disk on which the stamens are attached: stipules absent.
          - G. Carpels free, not joined..... 14. SPIRÆA
          - GG. Carpels connate..... 15. SIBIRÆA
        - FF. Fls. without staminal disk: stipules large but caducous.
          - G. Follicles 1 or 2, not inflated, dehiscent only ventrally.
            - H. Seeds usually 5 (sometimes more) and pistils mostly 2: style terminal..... 16. NEILLIA
            - HH. Seeds 1 or 2 and pistil 1: style lateral..... 17. STEPHANANDRA
          - GG. Follicles 1-5, inflated, dehiscent on both sutures..... 18. PHYSCARPUS
        - EE. Lvs. 2-3-pinnate: herb..... 19. ARUNCUS
      - DD. Pistils 5, opposite the sepals.
        - E. Petals long and narrow: lvs. ternate or 3-lobed: herbs..... 20. GILLENIA
        - EE. Petals short and rounded: lvs. 1-pinnate: shrubs and sub-shrubs..... 21. SORBARIA
  - B 5. Fr. a large or conspicuous drupe formed from a single 2-celled ovary in the bottom of the calyx-cup but free from it (stone-fruits)..... 22. PRUNUS
  - AA. Ovary inferior, the carpels 2-5 and more or less joined and immersed in the calyx-tube or hypanthium, forming a core: fr. a pome.
    - B. Core of fr. hard and bony, comprised of the hardened carpels that form stones or pyrenes, each stone containing 1 or 2 seeds.
      - C. Fertile ovules 2 in each carpel, the stones or pyrenes therefore 2-seeded: lvs. usually entire or closely crenate.
        - D. Plant spineless: lvs. entire..... 23. COTONEASTER
        - DD. Plant spiny: lvs. crenate..... 24. PYRACANTHA
      - CC. Fertile ovule 1 (exception in Cratægus, No. 4): lvs. commonly double serrate, often lobed.
        - D. Lvs. pinnate..... 25. OSTEOMELES
        - DD. Lvs. simple, but sometimes pinnately lobed.
          - E. Fls. clustered, mostly less than 1 in. across..... 26. CRATÆGUS
          - EE. Fls. solitary on shoots of the season, 1 in. or more across: fr. without a "stem" or pedicel..... 27. MESPILUS
    - BB. Core parchment-like or papery, the carpels not forming stones or pyrenes, each cell 1-2-many-seeded.
      - C. Cells (carpels) of fr. many-seeded.
        - D. Fls. solitary on leafy shoots of the season, 1 in. or more across: fr. without a "stem" or pedicel..... 28. CYDONIA
        - DD. Fls. solitary or fascicled, sessile or nearly so from winter-buds and therefore mostly in advance of foliage..... 29. CHENOMELES
      - CC. Cells 1-2-seeded.
        - D. Fls. on fleshy pedicels in terminal racemes or little panicles..... 30. RAPHIOLEPIS
        - DD. Fls. in simple more or less declined or drooping racemes..... 31. AMELANCHIER
      - DDD. Fls. corymbose or cymose-corymbose, the peduncles forked or branching, the cluster short and compact.
        - E. Carpels joined together, the styles usually 5: fr. pyriform, fleshy..... 32. ERIOBOTRYA
        - EE. Carpels partly or wholly free: styles usually 2, distinct or joined.
          - F. Fr. hollow, open at top: lvs. simple.
            - G. Stamens 20..... 33. PHOTINIA
            - GG. Stamens 10..... 34. HETEROMELES
          - FF. Fr. closed and pointed at top: lvs. simple or pinnate.
            - G. Lvs. evergreen, without glands on midrib..... 35. STRANVÆSIA
            - GG. Lvs. deciduous.
              - H. Lf.-margins sharply or doubly serrate; lvs. pinnate or simple, without glands on upper surface..... 36. SORBUS
              - HH. Lf.-margins closely crenate-serrate; lvs. simple, with glands on midrib above..... 37. ARONIA
      - DDDD. Fls. in umbels with the lvs..... 38. PYRUS

1. ROSA, L. ROSE. Prickly shrubs, sometimes climbing and trailing, more than 100 species (although thousands have been described), mostly in the temp. parts of the northern hemisphere; many of them are prime favorites for ornament under glass and in the open.—Lvs. alternate, odd-pinnate (one species, not here described, with simple barberry-like lvs.), deciduous or evergreen, with stipules adnate to petiole, often aromatic-glandular: fls. solitary or corymbose or panicleate; petals 5, broad and mostly rounded at end, these and the many whorled stamens inserted on a disk at the edge of the calyx-tube or hypanthium; pistils many, borne on the inside of the deep hypanthium: fr. a fleshy hip (ripened hypanthium) containing the hairy achenes as if they were seeds. (Ro-sa: the ancient Latin name.)—The cult. roses may be ranged, for purposes of identification, under two groups: (1) The “species,” those kinds grown as shrubbery or for general use in the landscape; here are comprised the native roses, some of which are more or less planted in grounds, and also such generalized exotic types as *R. rugosa*, *R. laevigata*, *R. Banksiae*, *R. Wichuraiana*, *R. spinosissima*, and many others. (2) The highly developed specialized roses of the distinct hort. types, as the Teas, Hybrid Teas, Hybrid Perpetuals, Ramblers; here are included the forcing or florist’s roses; they are the issue of several species, mostly of *R. odorata*, *R. chinensis*, *R. damascena*, *R. cathayensis*, *R. multiflora*, with other combinations in evidence and still others constantly appearing; these roses are mostly impossible of close identification with the original specific types, although the main lines of origin are usually fairly evident.

- A. Styles manifestly exerted beyond the mouth of the hypanthium (or hip).
- B. Stamens about as long as styles, the latter connate into a column.
- C. Stipules deeply fringed or pectinate (No. 3 may be sought here).
- D. Fls. white, many and small, in panicles..... 1. *R. multiflora*
- DD. Fls. pink or rose, larger,  $1\frac{1}{2}$  in. or more across, few in short open clusters..... 2. *R. cathayensis*
- CC. Stipules entire or only denticulate.
- D. Plant prostrate or creeping.
- E. Fls. commonly several together: lvs. more or less evergreen and shining.
- F. Lfts. usually 9, obtuse, broad..... 3. *R. Wichuraiana*
- FF. Lfts. usually 5, acuminate or at least not obtuse, narrow.... 4. *R. sempervirens*
- EE. Fls. commonly solitary: lvs. deciduous and dull; lfts. mostly 7. 5. *R. arvensis*
- DD. Plant erect or upright, with long arching branches, sometimes partially climbing.
- E. Lvs. persistent or partially so, the lfts. (about 5) narrow and long-acuminate, glabrous beneath..... 6. *R. anemoneflora*
- EE. Lvs. deciduous, the lfts. on the ovate order.
- F. Lfts. 3 or 5 on flowering branchlets, pubescent beneath..... 7. *R. setigera*
- FF. Lfts. 5–9 on flowering branchlets.
- G. Prickles nearly or quite straight: lfts. glabrous or clothed only on midrib beneath..... 8. *R. moschata*
- GG. Prickles hooked: lfts. pubescent beneath..... 9. *R. Brunonii*
- BB. Stamens about half as long as styles, the latter free.
- C. Lvs. glabrous beneath: sts. with only prickles, not bristles.
- D. Foliage evergreen (persistent) or essentially so.
- E. Fls. very fragrant, white, light pink or yellowish; sepals entire. 10. *R. odorata*
- EE. Fls. little if at all fragrant, red or pink but only seldom whitish; sepals pinnate..... 11. *R. chinensis*
- DD. Foliage deciduous: fls. many together..... 12. *R. Noisettiana*
- CC. Lvs. somewhat pubescent beneath: sts. with bristles as well as prickles..... 13. *R. borboniana*
- AA. Styles not exerted, forming a head-like stopper to the mouth of the hypanthium.
- B. Plant commonly erect or at least not long-sarmentose, making a bush: stipules adnate to petiole more than half their length.
- C. Lvs. of flowering branchlets large and firm, with 3 or 5 lfts.: hypanthium hispid (exception usually in No. 17).
- D. Lfts. doubly glandular-serrate: sts. with very unequal prickles.
- E. Fls. on upright pedicels, single or semi-double with spreading petals..... 14. *R. gallica*
- EE. Fls. nodding or declined, commonly double, petals erect and imbricate..... 15. *R. centifolia*



- DD. Lfts. simply serrate and not glandular; prickles uniform.  
 E. Shape of lfts. ovate-oblong; hypanthium glandular-hispid. . . . . 16. *R. damascena*  
 EE. Shape broader; hypanthium commonly smooth. . . . . 17. *R. alba*  
 CC. Lvs. of flowering branchlets not very large nor firm, mostly with  
 5-11 lfts.; hypanthium smooth.  
 D. Fls. clustered; or, if solitary, then the pedicel bearing 1 or more  
 bracts.  
 E. Prickles of one kind, stout and hooked, but sts. sometimes  
 also bearing glandular bristles.  
 F. Foliage nearly or quite glabrous  
 G. And tinged red. . . . . 18. *R. glauca*  
 GG. And green. . . . . 19. *R. canina*  
 FF. Foliage glandular-serrate, tomentose beneath, not aromatic. . . . . 20. *R. pomifera*  
 FFF. Foliage aromatic, glandular-serrate and also glandular on  
 both surfaces, lightly pubescent or glabrous beneath. . . . . 21. *R. Eglanteria*  
 EE. Prickles of two kinds, straightish and slender at least toward  
 base of plant and others more or less bristle-like.  
 F. Achenes only in the bottom of the usually glandular-hispid  
 hip: sepals spreading after anthesis. . . . . 22. *R. carolina*  
 FF. Achenes both in the bottom and on the walls of the usually  
 smooth hip: sepals upright after anthesis.  
 G. Branches glabrous. . . . . 23. *R. cinnamomea*  
 GG. Branches tomentose. . . . . 24. *R. rugosa*  
 DD. Fls. usually solitary (rarely few), and the pedicels bractless,  
 often yellow.  
 E. Sepals prevailing pinnate; fls. yellow, with disagreeable odor. 25. *R. foetida*  
 EE. Sepals entire, sometimes ciliate.  
 F. Flowering branchlets bristly and prickly; fls. white or pink  
 to yellowish. . . . . 26. *R. spinosissima*  
 FF. Flowering branchlets usually not bristly; fls. yellow.  
 G. Stipular wing scarcely evident on petiole. . . . . 27. *R. Hugonis*  
 GG. Stipular attachment along petiole making a prominent  
 wing. . . . . 28. *R. xanthina*  
 BB. Plant climbing or requiring high support; stipules small, free or adnate  
 to petiole only at base; fls. white or yellowish.  
 C. Branches tomentose or pubescent; fls. with prominent bracts beneath. . . . . 29. *R. bracteata*  
 CC. Branches glabrous; fls. without evident bracts.  
 D. Fls. solitary, large, white (to blush). . . . . 30. *R. laevigata*  
 DD. Fls. clustered, small, white or yellowish. . . . . 31. *R. Banksia*

1. *R. multiflora*, Thunb. A vigorous prickly bush of attractive habit, the branches often long and somewhat climbing; stipules prominent, extending about half or more the length of the petiole, pectinate and with the terminal points slender and conspicuous; lfts. 5-11, but prevailing 9 in full-formed lvs., mostly not exceeding  $1\frac{1}{2}$  in. long on flowering branchlets and often much less, broad-oval or slightly obovate and usually abruptly short-pointed; fls. many, 25 to more than 100, in a long or pointed panicle, white, very fragrant,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across; sepals pubescent, ovate-acuminate, becoming reflexed after flowering; fr. globular to ovoid or obovoid,  $\frac{1}{4}$  in. or less diam., brown-red. Japan; there are double-fl. forms in cult.

2. *R. cathayensis*, Bailey (*R. multiflora* var. *cathayensis*, Rehd. & Wils.). Lfts. larger and more acuminate-pointed than in No. 1, usually 5-7; fls. larger, usually  $1\frac{1}{2}$  in. or more across, less fragrant, pink or rose-colored, 20 or less in an open corymb-like cluster on longer and often glandular pedicels; fr. usually larger. China.

From Nos. 1 and 2, known as the Multiflora roses, have come many garden kinds, probably both by variation and by hybridization with other species, characterized in general by the clustered infl. and the pectinate stipules. No. 2 has probably entered more largely into them, carrying its color. *R. cathayensis* is represented in such vars. as Triumph Orleansais, Erna Teschendorff, Wedding Bells, Queen Alexandra, Wartburg, Crimson Rambler. *R. Barbierana*, Rehd., is a series of hybrids between *R. cathayensis* and *R. Wichuraiana*, named in compliment to Barbier et fils, Orleans, France; here apparently belong Excelsa, Farquhar, Evangeline, Babette, Lady Godiva, Delight, Coquina, Paradise, and others. Hybrids between *R. multiflora* and *R. Wichuraiana* are represented in White Dorothy and other white ramblers. *R. polyantha*, Hort., represents hybrids of No. 1 or No. 2, or both, with *R. chinensis*, although the name is sometimes given a wider significance. There are many crosses of the Multifloras with *R. borboniana*, giving Abundant, Longwood, Dazzling Red, and others. There are also hybrids with *R. rugosa* and *R. dilecta*.

3. *R. Wichuraiana*, Crép. MEMORIAL ROSE. Evergreen or half-evergreen, prickly, with fine shining foliage and long sts. flat on the ground; sts. glabrous, but

petioles, rachis, and pedicels usually glandular: lvs. small, 2-4 in. long, lfts. usually 9 but sometimes 7, short-oval or almost orbicular,  $\frac{1}{2}$  1 in. long, nearly sessile and the terminal one stalked, simply-serrate, the stipules conspicuous and glandular-denticulate: fls. few or rather many in a cluster, white, fragrant,  $1\frac{1}{4}$  2 in. across: fr. ovoid, about  $\frac{1}{4}$  in. diam. (Bears the name of Max E. Wichura, botanist on the German expedition to China and Japan in 1859-61; died 1866.) Japan.—An attractive rose for ground-cover; it has entered into hybrids with the Multifloras and other species; Dorothy Perkins is one of the offshoots. *R. Wichuriana* is by some regarded as a form of *R. Lucia*, Franch. & Rochbr., of Japan, an earlier-described species.

4. *R. sempervirens*, L. Evergreen with long lopping or decumbent branches and shining foliage: sts. prickly and glabrous: lfts. narrow, 5 but sometimes 7, lanceolate to ovate-lanceolate,  $\frac{3}{4}$ -2 in. long, abrupt or acuminate, simply serrulate, glabrous above but usually pubescent on ribs and rachis beneath: fls. few to several in corymbs, white, slightly fragrant,  $1\frac{1}{2}$ -2 in. across, the pedicels more or less glandular-hispid: fr. globose or ovoid,  $\frac{1}{4}$  in. or less diam., orange-red. Medit. region.—Little planted in this country; there are double-fl. forms and apparent hybrids.

5. *R. arvensis*, Huds. Very thorny deciduous shrub with long more or less decumbent or creeping branches: sts. glabrous: lvs. 2-4 in. long: lfts. commonly 7, small,  $\frac{1}{2}$   $1\frac{1}{2}$  in. long, ovate to round-elliptic, acute but usually not acuminate but sometimes rounded at end and scarcely pointed, serrate, glabrous or slightly pubescent beneath: fls. few in umbel-like corymbs or sometimes nearly or quite solitary, white, not fragrant, 2 in. or less across: fr. ovoid. Eu.—Known in cult. mostly as the Ayrshire rose, double white or pink, which is probably a hybrid with *R. gallica*.

6. *R. anemoneflora*, Fort. A half-evergreen climbing rose, glabrous or the young growth puberulent, spines scattered and hooked but not very strong: lfts. 5 or 7, lanceolate to ovate-lanceolate,  $1\frac{1}{2}$ -3 in. long, long-acuminate, sharp-serrulate, glabrous or lightly pubescent on rib beneath: fls. solitary or few on short pedicels, white or pinkish, about  $1\frac{1}{2}$  in. across, double with the inner petals smaller and giving it an anemone effect. Sometimes occurs as a trellis and veranda rose in the S.; recently discovered in the single-fl. state in China.

7. *R. setigera*, Michx. PRAIRIE ROSE. Strong bush with long branches that show a strong tendency to climb, with scattered nearly straight prickles but no bristles: sts. glabrous, but petioles, pedicels and calyx glandular: lfts. 3-5, ovate to oblong-ovate, 1-3 in. long, acute or short-acuminate, sharply serrate, glabrous or downy beneath (tomentose beneath in var. *tomentosa*, Gray): fls. few in corymbs, deep rose fading whitish, 2 in. across, nearly scentless: fr. globular,  $\frac{1}{3}$  in. across. E. N. Amer.—Frequently planted and probably hybridized; Baltimore Belle is one of the old derivatives: American Pillar is a hybrid with *R. Wichuriana*.

8. *R. moschata*, Mill. MUSK ROSE. Shrub with curving or somewhat climbing branches, glabrous, with rather small straight or slightly hooked prickles: lfts. mostly 5 or 7, elliptic-ovate to oblong-ovate, 1-2 in. long, acute or acuminate, finely serrate, glabrous except on midrib beneath, petioles and rachis usually prickly but nearly or quite glabrous: fls. white,  $1\frac{1}{2}$  2 in. across, with the odor of musk, about 7 in a corymb; sepals lanceolate and much longer than the hypanthium, lobed, deciduous; pedicels slightly pubescent and glandular: fr. ovate, small. S. Eu. and N. Afr.—An old garden rose but probably not now in cult. outside botanic gardens.

9. *R. Brunonii*, Lindl. HIMALAYAN MUSK ROSE. More tender than No. 8 and confused with it, apparently little cult.; differs in prickles short and hooked, in narrow lvs. that are soft-pubescent beneath and sometimes pubescent above, with petioles and rachis also pubescent and with scattered prickles: fls. in large many-fl. corymbs, white,  $1\frac{1}{2}$ -2 in. across, fragrant. (Named in honor of the great botanist, Robert Brown.) Himalayas to W. China.

10. *R. odorata*, Sweet. TEA ROSE (from the odor). Plant blooming on shoots of the year, with recurrent season of bloom; branches long and slender, more or less climbing: sts. glabrous, peduncles rather short and setose-glandular; prickles few, scattered and hooked: lvs. evergreen or partially so; lfts. 5-7, elliptic to broad-ovate or oblong-ovate,  $1\frac{1}{2}$  3 in. long, acute or short-acuminate, strongly sharp-serrate, shining above, light-colored and glabrous beneath; stipules glandular-ciliate only on upper part if at all: fls. 1-3, white, light pink or salmon-yellow, 2-3 in. and more across, very fragrant; sepals caudate-pointed and entire: fr. nearly or quite globose, red. W. China, and now widely cult. in many forms, many of them with double fls., others (var. *gigantea*, Rehd. & Wils.) with fls. 4-6 in. across; the tea roses of greenhouses and open gardens are variants and hybrids from this species. This and No. 11 are sometimes known as *R. indica*.

11. *R. chinensis*, Jacq. CHINA OR BENGAL ROSE. Differs from No. 10 largely in the glandular-ciliate stipules, smaller usually red or sometimes pink (rarely varying to whitish) fls. that are odorless or nearly so, outer sepals pinnate or deeply lobed, fr. top-shaped. China; less grown than No. 10.—The Fairy roses, var. *minima*, Rehd., are very dwarf compact bushes about 1 ft. high, much branched, with small narrow acuminate lfts. and rose-red fls. 1 1½ in. across. The Green rose is var. *viridiflora*, Dipp., the petals being represented by narrow serrulate green lvs. The Manetti rose, var. *Manetti*, Dipp., is used for stocks on which to bud or graft other roses; grows from cuttings; vigorous and upright; fls. single or semi-double, pink.

12. *R. Noisettiana*, Thory. NOISETTE OR CHAMPNEY ROSE. Supposed hybrid of *R. chinensis* and *R. moschata*, raised by John Champney of Charleston, S. C., early last century, from which seedlings were obtained and distributed by the Noisette Brothers of Charleston and Paris: a summer and autumn bloomer with deciduous foliage, bearing uniform reddish hooked prickles: lfts. 5-7, narrowly or broadly oblong or oval, acute or short-acuminate: fls. usually many in a corymb, variously doubled, white, pink, red, yellow: known in many forms, not always clearly defined; one of the offshoots is *Maréchal Niel*.

13. *R. borboniana*, Desp. (*R. borbonica*, Mouill.). BOURBON ROSE. Supposed hybrid of *R. chinensis* and *R. gallica*, issuing from a rose introduced from the island of Bourbon about 1819: upright, the branches prickly and often glandular-hispid, pedicels usually glandular: lfts. mostly 7, ovate to ovate-lanceolate, 1-2 in. long, mostly acute, sometimes abruptly acuminate, shining above, slightly pubescent beneath; stipules glandular: fls. solitary, or few in a corymb, in summer and autumn, 1½-3 in. across, usually red or purple, double or semi-double; sepals entire or somewhat lobed.—An important parent stock for the breeding of roses; subsequent crossing of it with species of the *R. gallica* group (Nos. 14 and 16) and forms of *R. chinensis* have given the Hybrid Bourbons; later arose the great class of Remontants or Hybrid Perpetuals known for their recurrent seasons of bloom, of which Jacqueminot is a representative kind. The Hybrid Teas are another class separated as *R. dilecta*, Rehd., derivatives of *R. odorata* and *R. borboniana*, the type of which is represented in La France; a familiar var. of it is American Beauty; this hybrid or group-species comprises slender-branched sometimes sarmentose roses, the sts. with scattered straight or hooked prickles: lvs. of firm texture, glabrous, often purplish when unfolding: fls. solitary or few in corymbs, white to red and yellow, fragrant; bud conical with recurving petals.

14. *R. gallica*, L. Small bush, 3-4 ft., with very sharp unequal somewhat curved prickles, and beset with weak bristles and glands: lvs. thick and rugose, 3-6 in. long, the stipules prominent and glandular-serrate; lfts. mostly 5, sometimes 3, oblong-ovate to broad-oval, 1-2 in. long, obtuse or only short-pointed, rounded at base and lateral ones sessile, rather obtusely doubly serrate and glandular, very dull above, pubescent beneath, rachis glandular and often prickly: fls. solitary or 3-4 together, pink to crimson, 2-3 in. across, on erect glandular-hispid pedicels, the petals spreading; sepals often foliaceous and much cut or lobed: fr. nearly globular to pear-shaped, ⅜-½ in. diam., dull red, with deciduous sepals. Eu., W. Asia.—An old and familiar garden rose and more or less escaped; occurs in many forms, double and semi-double. Var. *versicolor*, Thory, has petals striped white and red; an old favorite.

15. *R. centifolia*, L. CABBAGE ROSE. Very like No. 14, and often confused with it, but a larger bush: differs in bearing stouter prickles, lvs. sometimes pubescent above, the lfts. mostly larger and thin, the rachis not prickly, fls. very double and very fragrant and declined or nodding on long and slender pedicels and with the many petals erect and overlapping like lvs. in a cabbage-head, fr. globular or ovoid never pear-shaped, with persistent sepals. Caucasus; one of the most ancient of cult. roses.—Var. *muscosa*, Sér. (*R. muscosa*, Ait.). MOSS ROSE. Calyx and pedicel very glandular and hispid, and sepals pectinate; sometimes the sepals are crested (var. *cristata*, Prév.).

16. *R. damascena*, Mill. DAMASK ROSE. Differs from Nos. 14 and 15 in having simply serrate not glandular lfts., prickles uniform or all alike, fr. long-pyriform (1 in. long). From *R. gallica* it is distinguished by the larger bush, thinner lfts., and large clusters of fls. The bush grows to 8 ft., the numerous stout hooked prickles often mixed with glandular bristles: lfts. smooth above and pubescent beneath: fls. 6-12 in a corymb, blush-white to red, sometimes striped, very fragrant, single or semi-double, on long upright pedicels which, with hypanthium, are glandular-hispid; blooms in summer and autumn. Origin unknown, probably a cultigen; an important source of attar of roses; the leading parent in this group of the Hybrid Perpetual roses.

17. *R. alba*, L. Strong upright bush 6-8 ft., with scattered uniform more or less hooked prickles and sometimes with bristles: lfts. usually 5, sometimes 7, oblong to broad-elliptic to ovate, 1-2½ in. long, short-pointed, simply serrate, grayish and somewhat wrinkled, glabrous above and pubescent beneath, stipules and usually the pedicels glandular: fls. white or soft pink, single or often double, 2-3 in. across, very fragrant, usually few or several together; sepals large, mostly lobed and sometimes foliaceous; hypanthium bristly or smooth: fr. oblong or ovoid, ½ in. long, bright red, sepals deciduous. Eu. but apparently nowhere indigenous and supposed to be a hybrid between *R. gallica* and *R. canina* var. *dumentorum*; yields attractive garden roses, as Mme. Plantier; also a source of attar of roses.

18. *R. glauca*, Pourr. (*R. rubrifolia*, Vill.). Upright, 6-7 ft., the sts. purple-glaucous with few straight or hooked prickles: foliage prominently tinged red with a glaucous cast; lfts. 5-9, rather narrow, elliptic to ovate-lanceolate, 1-1½ in. long, mostly acute, simply serrate, glabrous: fls. single, pink to red, 1½ in. across, few to several in a cluster on mostly glandular-hispid short pedicels; sepals caudate, exceeding petals, usually a little expanded near the end: fr. globular or nearly so, about ½ in. long, red, the sepals persisting for a time. Mts. in Cent. Eu.—Planted for its character as a shrub rather than specially for fls. *R. glauca*, Vill., which is properly *R. Reuteri*, Godet, is sometimes planted in botanic gardens.

19. *R. canina*, L. DOG ROSE. Strong variable species, 6-12 ft., with scattered uniform strongly hooked prickles and no bristles: sts. glabrous: lfts. 5 or 7, oval, elliptic or ovate, 1-1½ in. long, acute or acuminate, sharp-serrate, glabrous or thinly pubescent and often glandular beneath, not resinous-dotted, stipules broad, usually somewhat glandular: fls. single, white or pinkish, 1-2 in. across, solitary or 2-5 together on short glabrous or glandular pedicels; sepals prominent, reflexed, 2 of them pinnately lobed, 2 usually entire and 1 mostly lobed on one side: fr. globular to ovoid, nearly ½ in. diam., red, smooth, the sepals finally deciduous. Eu. and W. Asia, a characteristic and common rose of lanes and waysides, somewhat escaped in N. Amer.—A frequent single rose in old gardens, sometimes coming up as the stock on which other roses are grafted. Var. *dumetorum*, Baker (*R. dumetorum*, Thuill.), is distinguished by the dull gray foliage which is pubescent and not glandular beneath. There are many named vars.

20. *R. pomifera*, Herrm. Sturdy much-branched bush, 4-6 ft.: sts. glabrous or slightly hairy, with long straight scattered prickles: lfts. 5 or 7, oblong to ovate or oval, 1-2½ in. long, obtuse or acute, doubly glandular-serrate, grayish-pubescent above and tomentose beneath, seldom becoming almost glabrous: fls. single, rose-pink, 1½-2½ in. across, solitary or 2-6 together on bristly and glandular pedicels: fr. large, about 1 in. diam., pyriform to globular, scarlet. Cent. Eu., sometimes cult. for its ornamental fr.

21. *R. Eglanteria*, L. (*R. rubiginosa*, L.). EGLANTINE. SWEETBRIAR. Stiff erect branching bush, 5-8 ft., with many strong hooked prickles and sometimes with bristles, pedicels hispid and usually glandular: lfts. 5-9, mostly 7, small, oval to orbicular, ¼-¾ in. long in flowering parts but to 1½ in. long on shoots, obtuse, doubly glandular-serrate, dull green and glabrous above, pale and often pubescent beneath, and sometimes above bearing many sweet-smelling glands: fls. single, pink, 1½-2 in. across, borne on short pedicels on leafy shoots singly or few or several together: fr. nearly globular or ovoid, about ½ in. diam., orange-red to scarlet, crowned with the long glandular-serrate at length deciduous sepals. Eu., and widely naturalized in N. Amer.—Much subject to the attacks of the gall-wasp, *Rhodites rosæ*, producing familiar hair-like galls. It is seldom grown as an ornamental but it is a parent in strong races of hybrids known as the Penzance Sweetbriar Hybrids, presumably crosses with *R. borboniana*. It also has been crossed with the Austrian Briar, *R. fatida*, producing a race known as *R. Penzanceana*, Rehd., with the fragrant lvs. of Eglantine and pink fls. suffused yellow.

22. *R. carolina*, L. (*R. humilis*, Marsh.). Suckering shrub 3-5 or 6 ft. high, often much lower on hard lands and blooming freely: sts. glabrous, usually with slender weak straight prickles at or near the nodes and bristles on young shoots, the pedicels frequently glandular-hispid: lfts. 5 or 7, oblong to narrow-oval or elliptic, ¾-1½ in. long, obtuse or short-acute, serrate, not shining above and usually pubescent beneath: fls. mostly solitary, sometimes 2 or 3 together, pink, single, 1½-2 in. across; outer sepals lobed: fr. globose to ovoid, about ½ in. diam. Me. to Ga. and westward to Mo.; now and then transferred to grounds and sometimes represented in double roses of apparent hybrid origin.—Other native roses of E. N. Amer. may be planted sometimes, as *R. virginiana*, Mill., much like *R. carolina* but with hooked prickles and thicker lvs. shining above; *R. nitida*, Willd., with densely bristly branches, straight prickles, and bright green shining lvs.; *R. palus-*



*tris*, Marsh., formerly known as *R. carolina*, a tall swamp rose with usually hooked prickles and finely serrate lfts.

23. *R. cinnamomea*, L. CINNAMON ROSE. Strong bush, 6 ft. or more but often blooming at 1 ft., with straight or slightly hooked prickles and others more or less bristle-like but not glandular, usually a pair of prickles at base of petioles: lfts. 5 or 7, oblong to obscurely obovate, 1-1½ in. long, simply sharp-serrate, obtuse or short-acute, glaucous-pubescent beneath: fls. often on unarmed branches, in shades of red, 2 in. across, single or variously double, fragrant, solitary or few-clustered, hypanthium and pedicels smooth: fr. mostly globular to oblong, ½ in. diam., red, with erect sepals. Eu. to N. China; an old garden rose, running wild and persisting about old premises, along fences, in cemeteries, and by roadsides.

24. *R. rugosa*, Thunb. Sturdy hardy erect much-branching very leafy shrub, 4-6 ft., the stiff sts. densely covered with prickles and bristles of different sizes, young growth and pedicels pubescent: lvs. heavy, 3-6 or 7 in. long; lfts. 5-9, oblong to oval or somewhat obovate, 1-2 in. long, thick and rugose, obtuse to only short-acute, serrate, soft-pubescent and somewhat glaucous beneath, the stipules broad and leafy: fls. few or solitary, fragrant, purple or white, single or semi-double, 2½-4 in. across; sepals long and often leafy, the caudate ends often expanded: fr. large, long-persistent, and showy, depressed-globose, 1 in. or more diam., red, crowned with the spreading sepals. China, Japan; common in yards and for hedges, sometimes escaped, making a characteristic and pleasing bush.—Named double-fl. forms are in gardens. *R. Bruntii*, Rehd., is a hybrid group, represented by Mme. Georges Brunt, combining *R. rugosa* with one of the Tea roses (*R. odorata* or *R. dilecta*). *R. Arnoldiana*, Sarg., represents the hybrids between *R. rugosa* and *R. borboniana*: sts. stout and upright, with slender bristles and prickles: lfts. 5 or 7, elliptic-ovate: fls. purplish, semi-double, above 2 in. across, few in corymbs on densely glandular pedicels. Hybrids are also known with *R. rugosa* and *R. multiflora* (producing *R. Iwara*, Sieber), with *R. Wichuraiana* (yielding *R. Jacksonii*, Willm.), and with other species.

25. *R. foetida*, Herrm. (*R. lutea*, Mill.). AUSTRIAN BRIAR. Shrub 3-5 ft. but sometimes producing much longer semi-climbing shoots, with slender straight prickles and no bristles: lfts. 5-9, broad-ovate to oval or somewhat obovate, ½-2 in. long, doubly glandular-serrate, dark green above and glabrous or with only scattered hairs, pubescent and glandular beneath; stipules glandular-serrate: fls. deep yellow, with unpleasant odor, 2-3 in. across, single (also a double-fl. form), usually solitary, on glandular pedicels; sepals often 1 in. long, often coarsely toothed and expanded at tip: fr. globular, ½ in. diam., red, not frequent. Asia; not frequent in gardens.—Var. *bicolor*, Willm. (*R. lutea* var. *punica*, Aschers. & Graebn.), has coppery colored petals. Var. *Harisonii*, Hort., common in American yards, is a free-flowering double pale yellow rose supposed to be a hybrid with *R. spinosissima*; originated about 100 years ago in New York City in the garden of Rev. Harison. The Pernetiana roses, starting with Jules Pernet-Ducher, a French hybridizer, are combinations of *R. foetida* and Hybrid Teas.

26. *R. spinosissima*, L. SCOTCH ROSE. Low bush, 3-4 ft., very close-leaved, densely provided with slender nearly or quite straight spines and stout bristles: twigs glabrous, pedicels sometimes glandular-hispid: lvs. small, 1-2 in. long; lfts. 5-11 but commonly 9, orbicular to oblong-ovate, very small, mostly ¼-½ in. long, obtuse, serrate, glabrous but sometimes glandular beneath: fls. many along the branches but solitary, white, pale pink, or sometimes yellowish, 1½-2 in. across; sepals entire: fr. globose, becoming black, ¾ in. or less diam. Eu. to China.—A wide-spread rose in cult. and running into many named forms. Var. *altaica*, Rehd. (*R. altaica*, Willd.), is larger in every way, with fewer bristles, pedicels smooth, fls. white.

27. *R. Hugonis*, Hemsl. HUGO ROSE. Handsome hardy rose blooming very early in the season, making flexible drooping reddish canes 5-8 ft. long, bearing rather stout straight flattened prickles and with bristles also on the shoots: lvs. small, mostly 1 2½ in. long, glabrous, the stipular wings on the petiole very narrow; lfts. 5-11, obovate or oval, ¾ in. or usually less long, obtuse, finely serrate: fls. solitary on short lateral shoots but very numerous, 2-2½ in. across, single, clear yellow, on glabrous pedicels; sepals pointed, much shorter than petals: fr. nearly globular, about ½ in. diam., scarlet becoming blackish-red. W. China, where it was discovered by Father Hugo, a missionary.

28. *R. xanthina*, Lindl. Much like No. 27, but prickles stouter and more broadly flattened at base, bristles lacking, stipules prominent on the petiole, lfts. usually pubescent beneath at least on the midrib and mostly larger, fls. semi-double. N.

China, Korea; the single-fl. state (forma *normalis*, Rehd. & Wils.) has been introduced into this country; long grown in China in the double-fl. form.

29. *R. bracteata*, Wendl. (*R. Macartnea*, Dum.). MACARTNEY ROSE. Stout evergreen shrub making long lopping or half-climbing shoots to 10 or 20 ft.: sts. tomentose, armed with very stout flattened hooked prickles in pairs and many scattered bristles: lvs. stiff, 2-4 in. long; lfts. 5-11, stalked, oblong to obovate,  $\frac{1}{2}$ -1 in. long and to 2 in. on vigorous parts, closely crenate-serrate, rounded but usually with a very short point, shining above, glabrous or nearly so beneath, stipules very short: fls. solitary or few together on very short stalks, white, single, 2-3 in. and more across, subtended by large toothed bracts; sepals densely silky-tomentose: fr. globular and woolly,  $1\frac{1}{2}$  in. diam., orange-red. S. China; planted and naturalized far S.; introduced in England in 1793 by Lord Macartney.

30. *R. lævigata*, Michx. (*R. sinica*, Murr. *R. cherokeensis*, Donn.). CHEROKEE ROSE. Rampant evergreen, climbing over fences and trees, with very stout strongly hooked prickles: lvs. 3-foliolate, stiff, glossy green, glabrous; lfts. (rarely 5) elliptic to ovate-lanceolate,  $1\frac{1}{2}$ -3 in. or more long, sharp-serrate, acute: fls. solitary, pure white (varying sometimes to rose), 2-3 $\frac{1}{2}$  in. across, very fragrant; sepals large, usually caudate: fr. obovoid with stipe-like base,  $\frac{3}{4}$  in. diam., bristly, with long upright sepals. China, Japan; planted in southern states and also extensively run wild as if native; first described from American plants.—*R. anemonoides*, Rehd., is a probable hybrid of this species with *R. odorata*: it is climbing, with 3 or 5 lfts., stipules adnate to petiole, and large single light pink fls.

31. *R. Banksiæ*, R. Br. BANKSIA ROSE. High-climbing evergreen with few or no prickles, twigs slender and glabrous: lfts. 3 or 5, rarely 7, oblong to oblong-lanceolate, 1-2 in. long, sharp-serrulate, acute or obtuse, shining, glabrous above, hairy on midrib beneath; stipules free from petiole, subulate and caducous: fls. small, few to many on very slender pedicels in umbel-like clusters, about 1 in. across, white or yellow, somewhat fragrant, single or usually variously double: fr. pea-size, sepals caducous. (Described from plants from the garden of Sir Joseph Banks; named in compliment to Lady Banks.) China; much planted for trellises and arbors in southern states and Calif.

2. *ALCHEMILLA*, L. LADYS MANTLE. Thirty to 40 perennial and annual herbs if *Aphanes* is included, as is usual, natives in north temp. zone and extending to the mts. of trop. Afr., one sparingly cult. for ornament.—Small herbs with lvs. palmately lobed or compound: fls. small, bisexual, greenish or yellowish and not conspicuous, in small corymbs aggregated into clusters; petals 0; calyx with 4-parted limb and as many accessory alternate lobes, with ring-like structure at opening of tube; stamens and pistils 1-4: fr. an achene included in the persisting calyx-tube. (*Alchemil-la*: from the Arabic name.)

*A. vulgaris*, L. Hardy perennial with strong horizontal rootstock, producing an attractive clump of long-stalked, pubescent, orbicular or reniform, grayish lvs., the blades 3-6 in. across with rounded shallow lobes and very sharp-serrate margins: fl.-st. 12-18 in. high, leafy, bearing a branching infl. half its length; fls. numerous, greenish-yellow,  $\frac{1}{2}$  in. across, long-persisting. Eu.; sometimes planted in borders: it is to be determined whether the prevailing cult. stock represents some of the recent segregates.

3. *SANGUISORBA*, L. Defined broadly the genus comprises about 35 perennial herbs in the north temp. zone, one somewhat known in cult.—Lvs. long, unequally odd-pinnate, alternate, stipules joined to petiole: fls. small, not showy, bisexual or unisexual, crowded in a dense head or spike terminating a long naked peduncle; petals 0; calyx with 4 petal-like lobes; stamens 4-12 or more, inserted on calyx-throat; pistils 1-3, styles slender, stigma fimbriate: fr. mostly a single achene inclosed in the persisting calyx-tube. (*Sanguisor-ba*: Latin *blood-stopping*, from reputed medicinal properties.)

*S. minor*, Scop. (*Poterium Sanguisorba*, L.). BURNET. Perennial, forming an attractive basal clump of fine foliage, glabrous or only sparsely hairy: lvs. narrow, with 6-10 pairs of nearly orbicular to oblong little notched lfts.: sts. 12-30 in. tall, forking, bearing globular or short-oblong heads about  $\frac{1}{2}$  in. broad; stamens and stigmas purplish and exserted, the lower fls. staminate and upper bisexual: achene

4-ribbed, muricate and wrinkled. Eu. and Asia, somewhat naturalized in this country; sparingly cult. for the young lvs. used as salad and mentioned as sheep forage.

4. **KERRIA**, DC. One shrub in Japan, commonly planted as an ornamental.—Spineless: lvs. alternate, simple, stipules awl-like and caducous: fls. solitary, terminating leafy shoots of the season, bisexual; sepals and petals 5, the former small and entire; disk annular in calyx-tube; stamens many, filaments filiform; pistils 5-8, the style slender: achene small and dry, seldom noted. (Ker-ria: William Kerr, Kew gardener and collector; died 1814.)

**K. japonica**, DC. (*Corchorus japonicus*, Thunb.). Bramble-like bush but without prickles, 4-8 ft. high, the branches green and ridged: lvs. ovate to ovate-lanceolate, 2-4 in. long, long-acuminate, toothed and the teeth serrate, short-petioled, very lightly pubescent on both surfaces or becoming glabrous above: fls. golden-yellow, 1-2 in. across, in late spring to autumn, sometimes seen in the single state but usually double when it is sometimes known as Globe-flower: there are races with yellow-striped canes and white-margined lvs.

5. **RHODOTYPOS**, Sieb. & Zucc. One shrub in Japan, differing from *Kerria* in the opposite lvs., 4 sepals and petals, the former large and toothed, petals white, fr. a nearly black prominent 1-seeded dryish drupelet. (Rhodotypos: Greek *rose type* or *kind*, from the resemblance of the fls. to small single roses.)

**R. kerrioides**, Sieb. & Zucc. Attractive hardy shrub 3-6 ft. and more high, spineless, with upright rather stiff habit, sts. becoming reddish: lvs. ovate to oblong-ovate, 2-4 in. long, acuminate, doubly sharp-serrate, short-petioled, rugose above, soft-pubescent beneath at least when young: fls. 1-1½ in. across, single, terminal on leafy shoots of the season, in late spring and early summer: drupelets about ¼ in. across, shining, in the spreading persistent jagged sepals, persisting till late autumn or winter.

6. **HOLODISCUS**, Maxim. (*Sericotheca* and *Schizonotus*, Raf.). A dozen species, more or less, of spirea-like shrubs inhabiting the western part of N. Amer., one of which is sometimes planted for ornament.—Deciduous, usually pubescent: lvs. alternate, simple but often deeply lobed: fls. many and small, white or whitish, in terminal panicles, unisexual; calyx cup-shaped, with 5 lobes or sepals valvate in the bud; petals 5; stamens about 20; pistils 5, alternate with sepals: fr. of 5 pubescent or hairy achenes inclosed in the calyx. (Holodiscus: Greek, referring to the *entire disk* in the fl.)

**H. discolor**, Maxim. (*Spiræa discolor*, Pursh). Strong bush to 20 ft., with bending pubescent branches: lvs. broad-ovate to oval, 2-3 in. long, pinnately many-lobed one-fourth to one-third the distance to the midrib, the rounded little lobes serrate, mostly glabrous above but pubescent or tomentose beneath: panicle 4-9 in. long, on drooping branches, the fls. creamy-white and very many; stamens prominent beyond the sepals. W. Mont. south and west.—Usually cult. in the var. *ariæfolius*, Aschers. & Graebn. (*Spiræa ariæfolia*, Sm.), with lvs. grayish-green and pubescent beneath.

7. **FILIPENDULA**, Mill. Nine or 10 species of tall hardy herbs, some of them grown for their showy fls.; native in the three continents of north temp. zone.—Lvs. alternate, interruptedly odd-pinnately divided, with large terminal lobe and stipules: fls. small but many, white, pink, or purple, bisexual, in large terminal panicles or cymose corymbs; calyx-lobes and petals 5 (sometimes 4 or 6); stamens many; disk not evident; pistils 5-15, each 2-ovuled: fr. little indehiscent capsules in a ring or twisted together. (Filipendula: Latin *hanging thread*, said to have allusion to the way in which the root-tubers of some species hang together by threads.)

- |   |                         |
|---|-------------------------|
| Lfts. 12 or more pairs, 1 in. or less long, pinnatifid..... | 1. <i>F. hezapetala</i> |
| Lfts. few and large, the terminal one palmately lobed.....  |                         |
| Fls. white.....   | 2. <i>F. Ulmaria</i>    |
| Fls. pink or purplish.....                                  |                         |
| Lateral lfts. several, deeply lobed.....                    | 3. <i>F. rubra</i>      |
| Lateral lfts. 1 pair, usually undivided.....                | 4. <i>F. purpurea</i>   |

1. **F. hexapetala**, Gilib. (*Spiræa Filipendula*, L.). DROFWORT. Rootstock tuberous: lvs. mostly radical, fern-like, 6-18 in. long and 1-2 in. broad, with numerous divaricate pinnatifid lfts., the terminal one not enlarged: st. 1-3 ft., little leafy, bearing a diffuse short cluster of white fls.  $\frac{1}{4}$ - $\frac{3}{8}$  in. across, the petals usually 6; a form has double fls. Eu., Asia; frequent in cult.; it has been confused with *Achillea Filipendula*.

2. **F. Ulmaria**, Maxim. (*Spiræa Ulmaria*, L.). QUEEN-OF-THE-MEADOW. Stout, 3-6 ft., making large patches: lvs. nearly or quite glabrous above and whitish-tomentose beneath; terminal lft. large and 3-5-palmately lobed; side lfts. of radical lvs. several pairs with small ones interposed, narrow-ovate, doubly serrate: fls. white, in dense clusters, sometimes double. Eu., Asia; somewhat naturalized in N. Amer.; there is a form with yellow-variegated lvs.

3. **F. rubra**, Rob. (*Spiræa palmata*, L. *S. lobata*, Gronov.). QUEEN-OF-THE-PRAIRIE. Tall and erect, 4-8 ft., glabrous: lvs. green both sides, pubescent only on veins beneath, margins irregularly dentate; terminal lft. large and 7-9-parted into narrow lobes 2-4 in. long; lateral lfts. also lobed, but these lfts. absent on the upper st.-lvs.: fls. many, attractive peach-blossom pink, in a feathery paniculate cyme, the stamens conspicuous: summer. Pa. south and west, and frequent in gardens, sometimes under the name "Meadow Sweet."

4. **F. purpurea**, Maxim. (*Spiræa palmata*, Thunb. and Hort., not *Filipendula palmata*, Maxim., which is not in usual cult.). Glabrous, 2-4 ft.: lvs. glabrous except on veins beneath, margins double-serrate; terminal lobe large, cordate or on the upper lvs. cuneate, 5-7- rather broadly lobed; lateral lfts. few (or none), oblong-ovate, not lobed: fls. pink or purplish, in a paniculate cyme, the stamens exserted but not specially prominent; summer. Japan.

8. **GEUM**, L. Species probably more than 50, if the genus is broadly defined, perennial herbs in temp. and cold regions, a few grown for ornament in the open.—Lvs. pinnate or lyrate with large terminal lobe, most of them radical or basal, those on the sts. smaller: fls. solitary or corymbose on simple or branching sts., bisexual, yellow, white or red; calyx with bell-shaped or flattish tube and 5 lobes with usually 5 bractlets between; petals 5, broad and showy in the cult. species; stamens many; pistils many, on a conical or cylindrical receptacle, ripening into achenes with long persistent styles which in some species are jointed and sometimes plumose. (Ge-um: an ancient name, of no evident application.)

**G. chilense**, Balb. (*G. coccineum*, Hort., not Sibth. & Sm. *G. atrosanguineum*, Hort.). Hardy perennial with many erect radical hirsute lvs. 8-12 in. long bearing a large terminal lobe and many unequal smaller pairs and parts below, the margins unequally toothed: fls. scarlet, single, about 1 in. across, or in full double races  $1\frac{1}{2}$  in., on slender pedicels in a determinate infl., the sts. bearing smaller lvs. passing into bracts above: achenes in a dense little head, hairy, with long hooked styles due to the falling of the upper joint. Chilean region; one form known in gardens as Mrs. Bradshaw.

9. **POTENTILLA**, L. CINQUEFOIL. FIVE-FINGER. A wide-spread genus in the north temp. and frigid zones, with upward of 200 species if defined broadly, annual and perennial herbs and a few of them shrubs, a small number cult. for ornament; as a whole, the genus is a difficult one for the systematist.—Lvs. digitately or pinnately compound, the larger ones usually basal (exception in No. 1): fls. mostly bisexual, solitary or cymose; calyx wide open, 5-cleft and with 5 bractlets between; petals 5, usually broad, yellow, white, or in shades of red; stamens numerous; pistils many on a mostly pubescent or hairy receptacle, the styles deciduous: achenes small, the receptacle dry in fr. (Potentil-la: Latin *potens*, powerful, from reputed medicinal qualities.)—There are named hybrids among the herbaceous kinds in cult.

The shrubby potentillas: fls. yellow or white. . . . . 1. *P. fruticosa*  
The herbaceous potentillas: fls. yellow or purple.

Fls. yellow.

Lvs. more or less villous or hairy beneath.

Basal lvs. usually ternate. . . . . 2. *P. grandiflora*

Basal lvs. palmately 5-foliolate. . . . . 3. *P. pyrenaica*



- Lvs. densely white-tomentose beneath,.....4. *P. argyrophylla*  
 Fls. purple or dark red.  
 Basal lvs. usually ternate.....5. *P. atosanguinea*  
 Basal lvs. palmately 5-foliolate.....6. *P. nepalensis*

1. *P. fruticosa*, L. (*Dasiphora fruticosa*, Rydb.). Widely variable very close-leafy little shrub 1-4 ft. high, with loosely shredding bark: lvs. all cauline, pinnate, more or less silky-pubescent above and prominently gray-silky beneath; lfts. 3-7, oblong to linear,  $\frac{1}{2}$  to frequently 1 in. long, entire, margins revolute: fls. bright yellow and showy,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. across, clustered in the top of the foliage or just above it, late spring to autumn. Around the world in the north temp. zone, in several forms that are sometimes recognized as species.—Var. *Veitchii*, Bean (*P. Veitchii*, Wils.), has white fls., lvs. not silvery above, glaucous beneath. China. Var. *Vilmoriniana*, Bean, has ochroleucous fls., and lvs. silvery-green above.

2. *P. grandiflora*, L. Herbaceous above the thick caudex, 6-15 in. high: basal lvs. mostly ternate, long-petioled; lfts. 1 in. long more or less, obovate, cut-serrate, pubescent above, short-villous beneath: fls. cymose, golden-yellow, 1 in. or so across, the petals broadly obovate, in summer. Alps.

3. *P. pyrenaica*, Ram. Herbaceous, 1 ft. or less high: basal lvs. palmately 5-foliolate; lfts.  $\frac{3}{4}$  in. or less long, obovate with cuneate base, dentate toward apex, nearly glabrous beneath: fls. racemose, golden-yellow, about 1 in. across, the petals obovate and emarginate, in summer. Pyrenees.

4. *P. argyrophylla*, Wall. Herbaceous, 1-1  $\frac{1}{2}$  ft., st. nearly simple and leafy: lvs. large, long-petioled, mostly ternate; lfts. broad-obovate or -oblong, coarsely sharp-serrate, silky above, densely white-tomentose beneath, sessile: fls. cymose, yellow, about 1 in. across, long-pedicelled, petals broadly obovate; summer. Himalayas.

5. *P. atosanguinea*, Wall. Like No. 4, but plant larger and more branched, lfts. silky rather than white-tomentose beneath, and usually petiolulate, fls. dark purple. Himalayas.

6. *P. nepalensis*, Hook. Plant stout, more or less purple, to 2 ft. high with racemose or paniculate branches: basal lvs. 10-12 in. long, palmately 5-foliolate, long-petioled; lfts. oblong-obovate, 2-3 in. long, crenate-serrate at apex, green both sides, with few appressed hairs: fls. about 1 in. across, purple, petals deeply emarginate; summer. Himalayas; probably the leading parent in the garden mixtures.—The purple-fl'd. potentillas with broad lfts. white-tomentose beneath are probably hybrids with No. 4; they are sometimes grown as *P. nepalensis*, *P. pyrenaica*, and *P. hybrida*; the fls. are frequently double.

10. **FRAGARIA**, L. STRAWBERRY. Low perennial herbs, in the north temp. zone and in the western hemisphere in high regions of the tropics; variable, and many species have been described, probably reducible to 20 or 30.—Plant making long runners but otherwise stemless, the fls. being borne on radical peduncles or scapes: lvs. pinnately 3-foliolate, stipules joined to base of petiole: fls. white or reddish, in small raceme-like clusters, sometimes nearly or quite unisexual, much as in *Potentilla* but receptacle enlarged and becoming very fleshy (forming the "berry") and holding the seed-like frs. on the surface. (Fragaria: Latin *fragrance*, from the odor of the fr.)

- Fls. and frs. standing well above the foliage: achenes superficial on the ripe fr.  
 Hull (calyx and appendages) spreading on the ripe fr.....1. *F. vesca*  
 Hull strongly reflexed.....2. *F. moschata*  
 Fls. and frs. underneath the foliage: achenes sunken in pits.  
 Lvs. thick, bluish-white beneath.....3. *F. chiloensis*  
 Lvs. thin, green beneath.....4. *F. virginiana*

1. *F. vesca*, L. Erect, 6-12 in. high, sparsely hairy: lvs. thin and light green, glabrous or becoming so above, lighter-colored and lightly silky-hairy beneath, at least on the veins; lfts. cuneate-ovate to rhombic-ovate, coarsely sharp-toothed: fl.-cluster small, equaling or exceeding the lvs., forking; fls. about  $\frac{1}{2}$  in. diam., bisexual: fr. (receptacle) firm, small, hemispheric or somewhat elongated and with a short neck, achenes very prominent, hull widely spreading. Eu., and a form of it in N. Amer.; source of the Alpine strawberries grown in Eu. and sometimes in N. Amer.; runs also into white-fruited forms; it sometimes bears again in autumn, and some at least of the Everbearing strawberries are derivatives of it; there is an old group of Perpetual strawberries described in the books.

2. *F. moschata*, Duchesne (*F. elatior*, Ehrh.). HAUTOBOIS STRAWBERRY. Taller plant, more pubescent, usually dioecious: fr. (receptacle) dull red, musky, the hull strongly reflexed. Eu., grown abroad but rarely known in this country.

3. *F. chiloensis*, Duchesne. Low stocky plant, runners mostly forming after fruiting: lvs. thick, more or less glossy above, bluish-white beneath and more or less hairy on veins; lfts. large, broadly cuneate-ovate, strongly toothed: fl.-clusters on short peduncle with long branches, scarcely erect or soon lopping; fs.  $\frac{3}{4}$  in. across: fr. (receptacle) large and firm, dark red, the very large hull spreading. Alaska to Patagonia.—Var. *ananassa*, Bailey, represents most of the common cult. strawberries, the origin of which, however, requires further study.

4. *F. virginiana*, Duchesne, the common wild strawberry of E. N. Amer. probably has entered into the evolution of the garden strawberries and is apparently discernible now and then in named vars.: more slender than No. 3, making runners rarely: lvs. thin, light green above and beneath: fl.-clusters small, on long peduncle which is usually erect: berry small, light scarlet, globular or oblong-conical, usually with a neck at base, the hull not very large and spreading.

11. **DUCHESNEA**, Sm. Two little running perennials like *Fragaria* but the fs. yellow, calyx-bractlets leafy and toothed, and the receptacle dry; both S. Asian, one widely naturalized and also cult. (*Duchesnea*: A. N. Duchesne, monographer of *Fragaria* in 1766.)

*D. indica*, Focke (*Fragaria indica*, Andr.). Stemless except for the very long runners, more or less hairy: lvs. long-petioled; stipules free from petiole; lfts. 3, rhombic-ovate, very short-stalked, rather bluntly toothed, silky-hairy at least beneath: fs. solitary, the corolla yellow and about  $\frac{1}{2}$  in. across: fr. (receptacle) small and dry, covered with the red achenes and surrounded by the large persistent calyx.—Sometimes used as ground-cover and in hanging-baskets and vases.

12. **RUBUS**, L. THE BRAMBLES, including raspberries, dewberries and blackberries, probably 500 species and important subspecies the world around but most abundant in the northern hemisphere.—Mostly shrubs, often prickly, erect, recurved, trailing or somewhat climbing, glabrous or variously pubescent: lvs. alternate, simple, pinnate or pedate, stipules more or less joined to petiole: fs. mostly bisexual, solitary, racemose, paniculate, or variously cymose, mostly white but sometimes pink or rose, in spring and early summer; calyx persistent, mostly 5-parted, without subtending bracts; petals 5, deciduous; stamens many and distinct, inserted on calyx; ovaries usually many, separate, 2-ovuled but 1 abortive: fr. an aggregate of 1-seeded drupelets (ripened carpels), cohering and sometimes permanently adhering to receptacle (when adhering and the receptacle coming off with the drupelets we have a dewberry or blackberry, when forming a cap and parting from the receptacle we have a raspberry); style slender and nearly terminal, usually remaining on the drupelet. (*Rubus*: the classical name for bramble, connected with *ruber*, red.)—Many of the species are perplexingly variable, and the genus is specially difficult to the taxonomist. The genus probably abounds in hybrids. Many of the pomological vars. cannot be referred to botanical species with certainty. For satisfactory determination, the foliage of the turions or new canes should also be collected.

A. Flowering canes or sts. annual, usually dying to ground each year..... 1. *R. xanthocarpus*  
 AA. Flowering canes biennial or perennial, not habitually bearing fs.  
 the first year (exception in No. 11).

B. Lvs. simple, usually lobed.

C. Plant without prickles.

D. Peduncles usually 1-fld..... 2. *R. deliciosus*

DD. Peduncles several-many-fld..... 3. *R. odoratus*

CC. Plant bearing prickles.

D. Fls. in small close terminal clusters..... 4. *R. crataegifolius*

DD. Fls. 1 or 2 in the axils..... 5. *R. palmatus*

BB. Lvs. of 3 or more lfts.

C. The raspberries: fr. (of cohering drupelets) separating from the receptacle, which remains on the plant. (*IDEOBATUS*.)

D. Number of lfts. on fruiting canes usually 3, on the ovate order.

E. Fls. large like single roses, solitary or 2 or 3 together..... 6. *R. spectabilis*

- EE. Fls. ordinary or small in size, mostly variously clustered.  
 F. Canes and petioles prominently red- or orange-hairy.  
 G. Lfts. of the oval-rounded kind, closely dentate..... 7. *R. ellipticus*  
 GG. Lfts. broader, ovate-acute, notched as well as dentate. 8. *R. phanicolasius*  
 FF. Canes and petioles not so.  
 G. Frs. in close corymb-like clusters, commonly black:  
 lvs. on new canes pedate if 5-foliolate..... 9. *R. occidentalis*  
 GG. Frs. in more or less elongated raceme-like clusters,  
 commonly red: lvs. on new canes pinnate if 5-  
 foliolate..... 10. *R. idæus*  
 DD. Number of lfts. on fruiting canes 5-9, sometimes 3, but  
 all on long-lanceolate order.  
 E. Canes annual (more or less herbaceous): fls. mostly 1½  
 in. or so across..... 11. *R. illecebrosus*  
 EE. Canes biennial or perennial: fls. (when not double) about  
 ½ in. across..... 12. *R. rosæfolius*  
 CC. The dewberries and blackberries: fr. adhering to receptacle  
 which detaches from plant. (EUBATUS.)  
 D. Plants creeping, prostrate, or strongly decumbent, rooting  
 at nodes or tips or both.—Dewberries.  
 E. Canes pruinose, often ascending but becoming prostrate  
 or trailing, terete and prickly on all sides, biennial or  
 perennial.  
 F. Species grown for ground cover: fls. bisexual: fr. of  
 few large drupelets..... 13. *R. cæsius*  
 FF. Species grown for the edible berries: fls. often imper-  
 fect: fr. firm, of many drupelets.  
 G. Fr. pilose.  
 H. Lvs. on turions 3-foliolate or simple: fr. black,  
 sweet: plants usually subdioecious..... 14. *R. ursinus*  
 HH. Lvs. on turions often 5-foliolate: fr. red, acid:  
 fls. bisexual..... 15. *R. loganobaccus*  
 GG. Fr. glabrous..... 16. *R. macropetalus*  
 EE. Canes usually not pruinose or with a bloom, and mostly  
 completely prostrate, the strong ones more or less  
 angled and prickles mostly on angles, biennial: fls.  
 bisexual.  
 F. Lfts., particularly on new canes or turions, broad and  
 usually large—on the ovate, cuneate-ovate, or cune-  
 ate-obovate order: canes prickly but not bristly.  
 G. Prickles strong and hooked, flat at base: lfts. of  
 turions not broadest toward base..... 17. *R. velox*  
 GG. Prickles weak and small, little or not hooked and  
 not prominently broad-based: lfts. usually broad-  
 est at or near base..... 18. *R. flagellaris*  
 FF. Lfts. on turions narrow and usually small,—on the  
 lanceolate or narrow-oblong order: canes commonly  
 bristly as well as prickly..... 19. *R. trivialis*  
 DD. Plants erect or arching, sometimes at length bending over  
 and rooting at tip but not prostrate or trailing, propagat-  
 ing (aside from seeds) mainly by suckers.—Blackberries.  
 E. Canes biennial, fruiting the second year and then dying:  
 foliage deciduous, and not white beneath.  
 F. Infl. elongated and not leafy, with strongly divaricate  
 pedicels and prominent gland-tipped hairs..... 20. *R. allegheniensis*  
 FF. Infl. abbreviated and usually leafy, at least the lower  
 pedicels strongly ascending.  
 G. Glands usually prominent on infl.: plants tall and  
 erect..... 21. *R. alumnus*  
 GG. Glands absent or very few.  
 H. Lfts. on fruiting shoots oblong-ovate or narrower  
 and gradually acuminate, evenly serrate: plant  
 erect..... 22. *R. argutus*  
 HH. Lfts. on fruiting shoots broader, coarsely un-  
 evenly toothed, short-acute or if acuminate  
 then prominently cut-dentate: plant recurv-  
 ing, sometimes touching ground at tip.  
 I. Apex of lfts. on fruiting shoots broad and very  
 short-acute; margin coarsely toothed..... 23. *R. frondosus*  
 II. Apex of lfts. acuminate; margin strongly cut..... 24. *R. recurvans*  
 EE. Canes perennial and very strong: foliage persistent, usu-  
 ally evergreen, often prominently white-tomentose  
 beneath.  
 F. Prickles very strong.  
 G. Lfts. cut into narrow divisions..... 25. *R. laciniatus*  
 GG. Lfts. not so cut.  
 H. Under surface of lvs. pubescent but not white..... 26. *R. macrophyllus* var.  
 HH. Under surface white-tomentose..... 27. *R. procerus*  
 FF. Prickles lacking..... 28. *R. ulmifolius* var.

1. *R. xanthocarpus*, Bur. & Franch. Shoots 10-12 in. high from horizontal roots, annual, lightly hairy, with a few weak prickles: lvs. 3-4 in. long, 3-foliolate, the terminal lft. ovate-oblong, the lateral ones small, all obtuse or very short-acute, the margin finely serrate, petiole and ribs prickly: fls. 1 or 2 in upper axils; calyx-lobes broad at base and long-pointed; petals white: fr. large, ovoid, bright yellow, very seedy, somewhat hirsute and old styles prominent. W. China; has been introduced for fr., but little known.

2. *R. deliciosus*, Torr. (*Oreobatus deliciosus*, Rydb.). ROCKY MOUNTAIN FLOWERING RASPBERRY. Attractive bush, 3-5 ft., with glabrous terete unarmed canes: lvs. orbicular-ovate to nearly reniform, 1-2½ in. broad, more or less shallowly or indistinctly 3-5-lobed, margins serrate-dentate, nearly or quite glabrous both surfaces: fls. white, solitary, to 2 in. across, like single roses, borne in spring and early summer: fr. hemispherical, purplish or wine-red, with soft slightly winged drupelets, not palatable. Mts. Colo.; grown for ornament.

3. *R. odoratus*, L. (*Rubacer odoratum*, Rydb.). FLOWERING RASPBERRY. Vigorous unarmed plant, 3-6 ft., with erect light-colored shredding canes, grown for ornament: lvs. broad-ovate cordate-based in outline, 4-10 in. across and sometimes less in length, with 3 or sometimes 5 triangular acuminate lobes, finely serrate, pubescent beneath and sometimes above: fls. in loose clusters, usually 1-1½ in. across, rose-purple; sepals long-pointed: fr. ¾ in. across, flattish, light red, dry and scarcely edible. N. S. to Mich. and Ga.—Var. *albidus*, Bailey, has whitish fls. and lighter colored bark. Var. *columbianus*, Millsp., has lf.-lobes lanceolate and cut-toothed. W. Va. *R. parviflorus*, Nutt. (*R. nutkanus*, Moc.) is much like No. 3, but has white fls.: Mich. to Mex. and Alaska.

4. *R. cratægifolius*, Bunge. Vigorous plant spreading rapidly, with nearly or quite glabrous canes bearing few straight spines: lvs. cordate-ovate to oblong-ovate, 3-4 in. long, or the upper ones narrower, acute or acuminate, 3-5-lobed, toothed and cut, glabrous: fls. about ½ in. across, white, in terminal close clusters, not showy: fr. small, orange-red, like a raspberry but of no value. China, Japan; sometimes grown for cover, as on banks.

5. *R. palmatus*, Thunb. MAYBERRY. Slender diffuse plant, 4-7 ft., sts. glabrous and with few scattered prickles: lvs. oblong-ovate to triangular-ovate, 2-3½ in. long, acuminate, mostly rather deeply 5-lobed, middle lobe much the largest, the margins coarsely notched and dentate, pubescent on veins beneath: fls. solitary in the axils, white, ¾-1 in. across, appearing with the foliage: fr. yellow. China, Japan; ornamental and has been introduced for fr.

6. *R. spectabilis*, Pursh. SALMONBERRY. Strong bush with hairy perennial sts. 5-15 ft. long that become glabrous with age, the spines few and weak or none: lvs. thin, ovate or oblong-ovate in outline, of 3 ovate acuminate somewhat lobulate sharp-dentate nearly glabrous lflets: fls. 1-4, slender-pedicelled, rose-colored or purplish, about 1 in. across: fr. ovoid or conical, ½-¾ in. diam., salmon-color to wine-red, the persistent styles prominent, edible. Ida. and Calif. to Alaska.

7. *R. ellipticus*, Sm. Very stout species with clambering canes 5-15 ft. long that are densely covered with reddish or brownish stiff hairs and bear stout straightish or recurved broad-based prickles: lflets. 3, thick, persistent, oval, elliptic or nearly orbicular, all stalked, the terminal one largest and 3-5 in. long, all obtuse or very short-acute, margins serrate, becoming glabrous above except perhaps on rib, gray- or white-tomentose and strongly veined beneath: fls. white, ½ in. or less across, in terminal panicles: fr. hemispheric, size of raspberry, yellow. India; planted in subtrop. and trop. parts for ornament; naturalized in Jamaica; sometimes called Golden Evergreen raspberry.

8. *R. phoenicolasius*, Maxim. WINEBERRY. Canes biennial, long and recurving, rooting at tips, beset with long red-brown glandular hairs, bearing weak nearly straight prickles: lflets. commonly 3, the terminal one 2-3 in. long, broadly cordate-ovate, stalked, the others smaller and sessile, all apiculate-dentate and sometimes obscurely shallow-lobed, glabrous above, white-tomentose beneath and purplish-veined: fls. several to many in terminal panicles, petals small and white, the bristly long-pointed calyx inclosing the small fr. till ripe, the berry then cherry-red and edible. China, Japan; ornamental and once recommended for fr.; infrequently escaped.

9. *R. occidentalis*, L. BLACKCAP. BLACK RASPBERRY. Strong and erect, 3-5 ft. and the very glaucous terete canes recurving and rooting at tip; prickles many, straight or little curved, not large: lvs. 3 foliolate or on strong new canes sometimes pedate, white-tomentose beneath, terminal lft. 3-4 in. long and prominently stalked, the lateral ones short-stalked or sessile, petiole commonly prickly; lflets.



ovate-acuminate, sharply double-dentate: fls. whitish, about  $\frac{1}{2}$  in. across, in dense prickly terminal small clusters and often a few scattering ones in axils below; petals shorter than the long-pointed tomentose calyx-lobes: fr.  $\frac{1}{3}$ – $\frac{1}{2}$  in. across in the wild but larger in cultivars, hemispherical, firm and seedy, sweet and aromatic, glaucous-black, amber-yellow in var. *pallidus*, Bailey (var. *flavobaccus*, Blanchard), N. B. to Minn. and Colo. and south in mts. to Ga. Farther west represented by *R. leucodermis*, Dougl. (*R. occidentalis* var. *leucodermis*, Focke), with yellowish canes mostly flatter-based and more strongly recurved prickles, lfts. less acuminate and cut-toothed, fr. reddish or black.—From *R. occidentalis* are derived the common cult. black (black-cap) raspberries.

10. *R. idæus*, L. RED RASPBERRY. Erect close grower, 3–5 ft., canes terete and more or less pruinose, the new ones bearing many straight or straightish rather stout broad-based prickles or sometimes almost or quite unarmed, in some forms bristly, propagating by suckers rather than by tips: lfts. 3, or if 5 on the new canes then pinnate, terminal one stalked and ovate, 2–4 in. long, the lateral ones narrower and sessile or very short-stalked, all whitish- or gray-pubescent beneath, the margins irregularly dentate: fls. small and whitish, about  $\frac{1}{2}$  in. across, 1, 2 or 3 on drooping pedicels from the axils and somewhat clustered at the apex, the infl. with bristles or glandular hairs: fr. oblong or conical, dark red, sometimes yellow or whitish. Eurasia, but named from Mt. Ida in Asia Minor where it was apparently abundantly known to the Greeks; native also in parts of N. Amer.—In cult. it has given rise to the garden red raspberries of Eu., some of which, represented particularly in the Red Antwerp, have been well known in N. Amer.

Var. *strigosus*, Maxim. (*R. strigosus*, Michx.). Distinguished by greater hardness, presence of glands and bristles in the infl., as well as usually on the new canes, the fr. lighter red, but these characters are probably unreliable for the determination of pomological kinds as there may be a tendency for bristles and glands to pass away under selection and cult. Wide-spread in N. Amer. and extending to E. Asia; accredited source of most of the American named red and golden raspberries.

*R. neglectus*, Peck, the PURPLE RASPBERRIES or PURPLE-CANES, is a series of hybrids between *R. occidentalis* and *R. idæus* var. *strigosus*. They may propagate either by tips or suckers but usually the latter, 5-foliolate lvs. on new canes either pedate or pinnate; the infl. is more drawn out than in No. 9 and yet mostly more aggregated at the top than in No. 10, the berries are firm, large, purplish to dull yellow and dull red. Occurs in the wild; and in cult. has given rise to Columbian, Erskine Park, Haymaker, Shaffer, and others.

11. *R. illecebrosus*, Focke. STRAWBERRY-RASPBERRY. Vigorous persistent plant with creeping roots, throwing up strong annual canes 2–4 ft. long and forming a mass of foliage, thereby fruiting late in season, the canes glabrous, angled, bearing flat-based more or less hooked or curved prickles: lvs. pinnate, with 5–9 lfts. and prickly long petiole and rachis; lfts. narrow-lanceolate, 2–4 in. long, acuminate, short-stalked except the terminal one, sharply double-serrate, glabrous both surfaces: fls. white, fragrant, mostly more than  $1\frac{1}{4}$  in. across, continuous on successive simple glabrous peduncles; petals broad and much narrowed at base; calyx-lobes with very long points usually exceeding petals; stamens and carpels very numerous: fr. somewhat hemispherical, scarlet, sour but pleasant when cooked. (*Illecebrosus: alluring, attractive.*) Japan; now not infrequent in this country, and in mild climates difficult to eradicate; grown mostly for ornament.

12. *R. rosæfolius*, Sm. Shrubby, the durable canes becoming 5–8 ft. long and more or less trailing, pubescent on the younger parts, bearing very flat-based more or less curved prickles: lfts. 5–7, lanceolate,  $1\frac{1}{2}$ –3 in. long, acuminate, all short-stalked or nearly sessile, sharply double-serrate, thinly hairy both surfaces, petiole more or less prickly: fls. white, about  $\frac{1}{2}$  in. across, on successive simple hairy peduncles; calyx-lobes caudate and much exceeding petals: fr. hemispherical, bright red, good to eat. E. Asia; grown somewhat on our southern limits and southward; naturalized in W. Indies; in Porto Rico accounted a native and the fr. sold.—Var. *coronarius*, Sims, has full double rose-like fls. 1 in. or more across. *R. probus*, Bailey, is grown in Porto Rico, differing in calyx-lobes not caudate or much if any exceeding petals although pointed, and red fr. depressed endwise giving it a flat appearance; probably a cultigen.

13. *R. cæsius*, L. Vigorous plant propagating extensively from the long prostrate rooting canes, which are terete, very glaucous, and bearing many weak straightish or curved sharp prickles without flat base: lvs. usually 3-foliolate, thin-hairy or glabrate above and somewhat hairy beneath; lfts. broad-ovate, 2–3 in. long, abruptly acuminate, doubly serrate, the petioles and ribs weak-prickly: fls. white,

to 1 in. across, few in an open short cluster, on prickly pedicels; calyx-lobes with slender points: fr. of a few large glaucous-black drupelets. Eurasia; introduced as a cover plant (sometimes erroneously called *R. dumetorum*), and becoming established. The foliage has good autumn color.

14. *R. ursinus*, Cham. & Schlecht. One of the Pacific coast blackberries or dewberries, the canes of all of which are usually erect or strongly ascending at first and then procumbent or trailing often becoming vine-like; canes biennial, soft-hairy the first year, carrying many weak straight almost bristle-like prickles: lvs. largely simple but often 3-foliolate, shallow-dentate, densely gray-pubescent or tomentose, glabrate or very thinly hairy above, margins more or less scalloped and sharply double-serrate, lobes and lfts. rounded at apex or very short-acute; simple lvs. broad-ovate or triangular-ovate, 2-4 in. long, cordate; lfts. of ternate lvs. of similar shape but rounded or somewhat tapering at base; fls. usually imperfect, few in crowded clusters on prickly pedicels, white, about 1 in. across; calyx-lobes about  $\frac{1}{2}$  in. long: fr. conical or oblong, of many drupelets, pilose, black (but white and red spots are reported). Calif. *R. vitifolius*, Cham. & Schlecht., also of Calif., is not tomentose and lvs. 3- or 5-foliolate on turions. One or the other of these species is supposedly the parent of the Aughinbaugh, once considerably grown in Calif., and also (probably in part) of loganberry.

15. *R. loganobaccus*, Bailey. LOGANBERRY. PHENOMENAL. Very robust and vigorous, the canes heavily armed with long straight prickles: lvs. very large, the blades 4-8 in. long, prevailing 3-foliolate but often 5-foliolate on turions, lfts. and lobes (at least of turions) prominently acute, simple lvs. few and only near the infl.: fls. bisexual,  $1\frac{1}{2}$ -2 in. across, white, showy (a double-fl. form is known); calyx-lobes  $\frac{1}{4}$ - $\frac{1}{2}$  in. long: fr. long-thimble-shaped,  $1\frac{1}{4}$  in. long, red, acid, drupes adhering to receptacle like a blackberry, pilose. Cultigen; supposed hybrid of *R. ursinus* and red raspberry. Phenomenal is of similar origin, and although a different pomological var. from loganberry, it is of the same botanical class.

16. *R. macropetalus*, Dougl. An essentially glabrate plant as compared with No. 14, without simple lvs. and the foliage green both sides, lfts. on turions long-acuminate and sharp-dentate: fls. imperfect: fr. glabrous. N. Calif. to B. C. and Ida.; sometimes cult. for fr., as probably in Humboldt, Skagit Chief, Washington Climbing, Belle of Washington.

17. *R. velox*, Bailey. Robust, glandless, the canes arching and running and becoming several ft. long, puberulent when young, strongly angled, bearing stout very sharp broad-based curved or hooked prickles free of bristles, the long puberulent petioles and the ribs with prominent hooked prickles: lfts. on turions 3, or 5 and pedate, the terminal one long-stalked, ovate or elliptic-ovate and 3-4 in. long, the lateral ones narrower and short-stalked, margins sharply and mostly doubly dentate, sparsely hairy above and soft-pubescent beneath, those of autumn growth less pubescent; lvs. on flowering shoots simple or ternate, the lfts. or blade oblong to oblong-ovate, 3-4 in. long, narrowing to base, short-acute, with relatively few very large and prominent teeth and strong sideribs, with few prickles on midrib; stipules long and prominent, sometimes dentate: fls. bisexual but often infertile, petals sometimes more than 5, 1- $1\frac{1}{4}$  in. across, solitary or in a successively forking infl., on elongated pubescent peduncles; calyx-lobes large, often foliaceous and lobed: fr. oblong, 1 in. or more long, black, very early. Probably native in Tex.; source of McDonald (another McDonald is apparently *R. trivialis*), Sorsby, Spalding, called either dewberries or blackberries.

18. *R. flagellaris*, Willd. (*R. procumbens* and *R. villosus*, Auth.). The common dewberry of the eastern states, from Canada to the Gulf, variable: long-running, rooting at tips, young shoots often erect or ascending; canes biennial, mostly angled with age, glabrous except sometimes at ends, with many backward-pointing prickles and no bristles, the flowering branches mostly short and erect from them: lvs. on turions 3- or 5-foliolate, usually glabrous both surfaces except on veins but sometimes lightly pubescent particularly at ends of canes; lfts. ovate, the terminal one 2-3 in. long and stalked, acute to acuminate, the lateral similar but nearly or quite sessile and sometimes lobed on lower side, margins sharply and usually doubly serrate-dentate; lfts. on flowering shoots usually similar but smaller although variable, sometimes lf. simple: fls. mostly  $\frac{3}{4}$ -1 in. across, white, long-pedicelled, solitary or on successive pedicels making a forking infl.; calyx-lobes prominent, sometimes with an extended point: fr. spherical to oblong, black, of relatively large drupelets.—Here belongs the Lucretia dewberry (var. *roribaccus*, Bailey) and a few others of less note.

Var. *invisus*, Bailey. Canes usually ascending but soon arching and prostrate, not very prickly, the foliage mostly light green, but marked particularly by the

large and nearly simple broad but apiculate teeth of the lfts. Bartel and a few other dewberries have come from this race.

Var. *michiganensis*, Bailey. Robust, with lfts. deeply and irregularly toothed or cut-toothed. *R. geophilus*, Blanchard; is similar, as also Mayes (Austin) dewberry.

19. *R. trivialis*, Michx. The trailing very prickly and often very bristly dewberry of fields Va. to Fla. and Tex., partially evergreen: lvs. of turions 3- or 5-foliolate, stiffish, glabrous; lfts. narrow-oblong or lanceolate, or oblanceolate, 1-2½ in. long, long- or short-acuminate, sharp-serrate, petioles prickly; lfts. on flowering branches smaller, obtusish or not acuminate: fls. solitary or few in open cyme, on prickly pedicels, white, ½-1 in. across: fr. oblong, black, varying to white races.—Several named kinds have come into cult., as Manatee, Bauer and others.

20. *R. allegheniensis*, Porter (*R. nigrobaccus*, Bailey, and var. *sativus*, Bailey). The common high-bush blackberry, from N. S. to N. C. and Mo.; erect, 2-10 ft., the canes sometimes bending over with weight of foliage and fr. but not recurving, with strong hooked prickles on the angles, the younger parts bearing spreading gland-tipped hairs: lvs. of turions 3- or 5-foliolate, terminal lfts. prominently stalked and others less so or sessile, pubescent beneath, sparsely hairy or glabrate above, petiole and rachis with glandular hairs among the pubescence; lfts. ovate or oblong-ovate, 3-5 in. long, acuminate, rather closely serrate; lvs. on flowering shoots similar but much smaller, 3-foliolate or becoming simple bracts in the infl.: fls. in an elongated cluster 3-6 in. long, with a continuous axis terminating in an early fl., the pedicels slender and divaricate, all parts as well as calyx pubescent and glandular-hairy: fr. oblong or thimble-shaped, of many small rather close drupelets, ½-1 in. long, sweet and aromatic, black (amber-white in var. *albidus*, Bailey).—Source directly or indirectly of many of the cult. blackberries, as Taylor, Snyder, Eldorado, Early Cluster, Ancient Briton, Agawam.

21. *R. alumnus*, Bailey. Tall erect stout very leafy plant of W. Mo. and probably elsewhere west, yielding excellent wild blackberries and often transferred to plantations: prickles flat-based; young growth pubescent and usually glandular: lfts. broadly elliptic-ovate, coarsely double-serrate: infl. rather short, leafy, mostly glandular-hairy; fls. very large: fr. often more than 1 in. long.

22. *R. argutus*, Link (*R. floricomus* and *R. Andrewsianus*, Blanchard, are similar). An erect bush blackberry ranging from N. J. to the Gulf of Mex., stout, 3-5 ft., more or less bending but not recurved, nearly glabrous or with fine pubescence on young shoots and infl. but very few if any stalked glands although sessile glands may occur; prickles numerous on the angles of the canes and on petioles, long, stout, some of them curved and some declined: lvs. firm, 3- or 5-foliolate, finely closely serrate; lfts. oval to oblong or obovate, 3-4 in. long, acute or acuminate, more or less pubescent beneath: clusters short, terminating leafy shoots, pedicels 5-10, some of them ascending in fr., the latter short-oblong and relatively few-seeded.—Apparently enters into pomological vars., in the Early Harvest class.

23. *R. frondosus*, Bigel. (*R. philadelphicus*, Blanchard). A high-bush blackberry ranging from New England to Va., 3-4 ft. but recurving and the tips often touching the ground but apparently little if at all rooting at the tip: canes terete, with rather few short somewhat curved prickles, young growths and infl. pubescent but not glandular: lfts. usually 3, terminal one stalked but others sessile, rather thick, short-ovate, 2-3 in. long, acute but not manifestly acuminate, coarsely serrate or toothed, soft-pubescent beneath, those on flowering shoots often somewhat obovate and with little or no point: infl. short and close, leafy: fr. spherical or nearly so, of rather large drupelets, sweet, black.—Perhaps a parent in cult. kinds.

24. *R. recurvans*, Blanchard (*R. arundelanus* and *R. Jeckylanus*, Blanchard). Differs from *R. frondosus* by its narrow pointed or acuminate lfts. on flowering shoots, and by all the lfts. being cut-dentate and often jagged: canes rising 2-4 ft. and on good land recurving and often rooting at tip: it has a character of intermediateness in habit between the high-bush blackberries and *R. flagellaris*, but bears no glands. N. S. to Ia.—Probably involved, with No. 23, in the origin of such short-cluster blackberries as Lawton, Mersereau, Blowers and Kittatiny.

25. *R. laciniatus*, Willd. CUT-LEAVED EVERGREEN BLACKBERRY. Very strong grower with perennial angled thick trailing or climbing canes and persistent foliage, young parts pubescent; prickles very strong, flat-based and hooked, on both canes and petioles: lvs. 3- or 5-foliolate but cut into many narrow acute dentate parts: fls. in prickly panicles, white or pinkish, about 1 in. across; calyx white-tomentose, the lobes long-pointed and reflexed: fr. small to medium, spherical or short-oblong, of large black drupelets. Cut-leaved form of a European species, spread in many parts of the world and often considered native; grown for ground cover and in some vars., as Starr or Atlantic, for the edible fr.



26. *R. macrophyllus*, Weihe & Nees, var. *amplificatus*, Lees. Very stout ever-green trailer or semi-climber introduced from Eu. for ground cover and to be expected in parks and grounds; prickles many and stout on the angled canes, petioles and infl.: lfts. stiff, 3 or 5, ovate, obovate or elliptic-ovate, 2-3 in. long, pointed or abruptly acuminate, sharp-serrate, somewhat pubescent beneath: fls. in long terminal hairy-pubescent panicles, white, with reflexed tomentose calyx-lobes: fr. small, few-seeded, of no importance.

27. *R. procerus*, P. J. Muell. HIMALAYABERRY. Differs from the diagnosis of No. 25 mostly in the still more vigorous growth, larger dentate not lacinate lfts. which are densely white-tomentose beneath as are the large panicles and calyx: fr. short-oblong or nearly spherical, of large drupelets, black. Eu., grown somewhat for the fr., and useful as an ornamental cover.

28. *R. ulmifolius*, Schott, var. *inermis*, Focke (*R. inermis*, Willd.). EVER-GREEN THORNLESS BLACKBERRY. Canes long and slender, sarmentose, striate and gray-pubescent above becoming terete and glabrous, devoid of prickles: lvs. rather small, 3- or 5-foliolate, terminal lfts. stalked and others sessile or nearly so, thinly hairy above, gray-pubescent beneath; lfts. oval or elliptic-ovate,  $1\frac{1}{2}$ -3 in. long, short-acuminate to nearly obtuse, finely double-serrate: fls. in a long panicle, usually pinkish, the calyx-lobes tomentose and reflexed: fr. ovoid or subglobose, black. Eu., sparingly introduced for its fr.

13. *EXOCHORDA*, Lindl. Three or 4 shrubs in Asia, one common in cult. —Spiræa-like, but individual fls. as large as apple-blossoms, fr. a 5-angled or -winged caps. that separates into 5 bony 1- or 2-seeded carpels, and the seeds wing-flattened: deciduous: lvs. alternate, simple, petioled: fls. white, more or less unisexual (polygamo-diœcious), in terminal racemes; calyx-tube broadly top-shaped, with a large disk; calyx-lobes and petals 5; stamens 15-25; pistils 5, connate but the styles distinct. (Exoch-orda: Greek *external cord*, referring to an internal structure in the carpels.)

Petals broad to nearly orbicular, abruptly contracted to claw; stamens 15. 1. *E. racemosa*  
Petals narrow, gradually tapering to claw; stamens 20 or more.

Mature lf.-blade rather abruptly contracted to petiole which is nearly  
or quite 1 in. long and usually red. . . . . 2. *E. Giralddii*

Mature blade long-contracted in shorter and stouter petiole. . . . . 3. *E. Korolkowi*

1. *E. racemosa*, Rehd. (*E. grandiflora*, Lindl.). Strong glabrous shrub to 8-10 ft. and more high, much branched, bearing a profusion of clear white fls. in mid-spring: lvs. elliptic to oblong-obovate, blades  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long and petioles about  $\frac{1}{2}$  in. long, obtuse but apiculate at apex, shortly narrowed at base, those on flowering shoots usually entire but those on verdurous parts obscurely serrate on upper half: fls. 6-10 in a raceme on pedicels  $\frac{1}{4}$  in. or less long,  $1\frac{1}{2}$ -2 in. across; petals roundish to broad-obovate, rather abruptly short-clawed; stamens 15: fr.  $\frac{3}{8}$ - $\frac{1}{2}$  in. long and nearly or quite as broad, ovoid to broad top-shaped, scarcely pointed. China.

2. *E. Giralddii*, Hesse. Larger and more vigorous than No. 1, the fls. shorter-pedicelled, open in the center or more stellate because of the narrower and longer-clawed petals that do not meet or overlap, petals sometimes 2-4-toothed at apex; stamens 25-30: lvs. oval or elliptic, not serrate or only exceptionally so, petiole  $\frac{3}{4}$ -1 in. long, slender and reddish. China; introduced to Eu. by seeds collected by the missionary, Father Giralddi.

3. *E. Korolkowi*, Lav. (*E. Alberti*, Regel). Blooms very early in spring, with erect habit and dark dense foliage: lvs. mostly on the oblong to oblanceolate order, obtuse or acute, long-tapering to a short stout petiole, those on strong shoots serrate above middle and sometimes lobed at base: fls. 5-8 in a raceme,  $1\frac{1}{2}$  in. across, petals narrow-obovate and long-clawed; stamens 25: fr.  $\frac{3}{4}$  in. long, ovoid and rather prominently short-pointed. (Dedicated to a Russian botanist.) Turkestan.—*E. macrantha*, Lemoine, is a hybrid between Nos. 1 and 3.

14. *SPIRÆA*, L. SPIRÆA. As at present delimited, about 75 species of deciduous shrubs in the northern hemisphere, many of them planted for ornament.—Habit various: lvs. alternate, simple, sometimes pinnately lobed, lacking stipules: fls. mostly unisexual, white, pink, or reddish, not large but conspicuous by being aggregated into umbel-like racemes, corymbs, or panicles;



calyx-tube bell-shaped or cup-shaped, bearing a disk; calyx-lobes and petals usually 5, mostly broad; stamens many, distinct; pistils commonly 5, superior and distinct, 2- to many-ovuled: fr. a dehiscent uninflated follicle. (Spiræ-a: probably from the Greek *speira*, wreath.)—Some of the spireas in rather common cult. are hybrids, but their origins are for the most part clear. The fls. are relatively small, the ornament lying in the great numbers of them.

- A. Infl. simple (pedicels arising from the axis, not borne on peduncles), racemose or umbel-like; fls. white.
- B. Fls. borne on old wood, in sessile leafless umbels, not on new leafy shoots (sometimes the lower clusters with lvs. at base).
- c. Lvs. entire or small-toothed only at apex, mostly 3-nerved from base..... 1. *S. hypericifolia*
- cc. Lvs. manifestly serrate or dentate, and penninerved.
- d. Lf. glabrous, linear-lanceolate..... 2. *S. Thunbergii*
- dd. Lf. pubescent, at least when young, oblong-lanceolate..... 3. *S. prunifolia*
- BB. Fls. on leafy shoots of the season.
- c. Margin of lf. finely serrate on upper half..... 4. *S. crenata*
- cc. Margin cut-serrate and often somewhat lobed.
- d. Stamens exserted: sepals reflexed..... 5. *S. chamædryfolia*
- dd. Stamens not exserted, only equaling the petals or shorter: sepals erect or spreading.
- E. Lvs. lanceolate to rhombic-lanceolate, penninerved..... 6. *S. cantoniensis*
- EE. Lvs. broad-ovate to orbicular in outline, palmately 3-5-nerved.
- F. Apex of lf. rounded..... 7. *S. trilobata*
- FF. Apex short-acute..... 8. *S. Vanhouttei*
- AA. Infl. compound (fl.-stalks branched); fls. white or pink.
- B. Fls. in corymbs or rounded clusters.
- c. Branches terete, puberulous when young: blossoms pink..... 9. *S. japonica*
- cc. Branches angular, nearly or quite glabrous.
- d. Blossoms white..... 10. *S. albiflora*
- dd. Blossoms pink to whitish: hybrid of Nos. 9 and 10..... 11. *S. Bumalda*
- BB. Fls. paniculate—in clusters at least as long as broad at maturity, sometimes nearly spicate.
- c. Panicle short, about as broad as long: hybrids..... 12. *S. conspicua*
- cc. Panicle elongated, normal.
- d. Lvs. nearly or quite glabrous.
- E. Blossoms light pink, panicle lightly tomentose..... 13. *S. salicifolia*
- EE. Blossoms white, the panicle glabrous..... 14. *S. latifolia*
- EEE. Blossoms white, panicle somewhat tomentose..... 15. *S. alba*
- DD. Lvs. manifestly pubescent or tomentose beneath.
- E. Fr. glabrous: lvs. grayish or whitish beneath..... 16. *S. Billiardii*
- F. Both ends of lf. acute..... 17. *S. Douglasii*
- FF. Both ends rounded or broad..... 18. *S. tomentosa*
- EE. Fr. pubescent: lvs. tawny beneath.....

1. *S. hypericifolia*, L. Small-leaved vigorous shrub, 4-6 ft., with curving graceful branches that are glabrous or soon becoming so: lvs. short-obovate to lance-obovate,  $\frac{3}{4}$  1 $\frac{1}{2}$  in. long, prominently tapering to base, very short-petioled, obtuse and with few small teeth near apex, with 3-5 lengthwise nerves, nearly glabrous: fls. pure white, about  $\frac{1}{4}$  in. across, in early spring in sessile umbels from last year's wood, just preceding the lvs. Eu., Siberia; planted in several forms.

2. *S. Thunbergii*, Sieb. Characteristic narrow-leaved shrub 3-5 ft. high, the tips usually dying back somewhat in winter so that the precocious profuse white bloom may not extend to the ends of the twigs, the plant of twiggy arching habit: lvs. linear-lanceolate, 1-1 $\frac{3}{4}$  in. long, sharp serrate: fls. few in sessile umbels,  $\frac{1}{4}$ - $\frac{1}{2}$  in. across, slender-pedicelled; petals obovate. (Carl Peter Thunberg, page 699.) China, Japan; blooms early in spring.

3. *S. prunifolia*, Sieb. & Zucc. BRIDAL WREATH. Pleasing shrub, 4-6 ft., erect, with very thin slightly pubescent young growth: lvs. oblong to ovate, 1-2 in. long, finely serrate, pubescent beneath, petiole  $\frac{1}{2}$  in. or less long: fls. clear white, very early,  $\frac{1}{3}$ - $\frac{1}{2}$  in. across, on slender pedicels in few-fl'd. sessile umbels in advance of the lvs. and sometimes another small crop in autumn, mostly full double, the single form not common; petals exceeding stamens. China, Japan.

4. *S. crenata*, L. Bushy shrub, 3-5 ft., with slender striped somewhat angled nearly or quite glabrous sts.: lvs. firm in texture, obovate to oblanceolate,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, acute both ways, serrate near the apex, 3-nerved, at first puberulent beneath: fls. white, small, on short leafy branches with the foliage, in mid-spring, in small semi-globose umbels; petals shorter than the stamens. S. E. Eu., Asia.—*S. multiflora*, Zabel, is a hybrid race between this species and *S. hypericifolia*:

white-fl'd., blooming just in advance of the foliage, distinguished from No. 3 in bearing the lower umbels on short leafy stalks; lvs. obovate. *S. arguta*, Zabel, hybrid of *S. multiflora* and *S. Thunbergii*, blooms earlier than *S. multiflora* and the lvs. are oblong; one of the most beautiful and free-flowering of the early spring spiræas.

5. *S. chamædryfolia*, L. Strong erect shrub with angular zigzag glabrous branchlets, 5-6 ft.: lvs. rather large, ovate to narrow-ovate,  $1\frac{1}{2}$ -3 in. long, short-acute, irregularly often doubly toothed, slightly glaucous, bluish-green and thinly pubescent on veins beneath: fls. white, about  $\frac{1}{2}$  in. across, many in umbel-like racemes or corymbs on leafy shoots of the season; petals shorter than the stamens. Eu. to Japan; variable.

6. *S. cantoniensis*, Lour. (*S. Reevesiana*, Lindl.). Shrub, 4-6 ft., with curving branches, in some places partially evergreen, much branched, young sts. glabrous: lvs. irregularly lanceolate to rhombic-lanceolate,  $1-2\frac{1}{2}$  in. long, acute or short-acute, irregularly double-serrate, bluish-green and glabrous beneath, penninerved with somewhat parallel veins: fls. white,  $\frac{1}{3}$ - $\frac{1}{2}$  in. across, in rather dense umbel-like corymbs on leafy shoots of the season, appearing with and after the lvs. China, Japan; known mostly in the double-fl'd. form.

7. *S. trilobata*, L. (*S. triloba*, L.). Attractive twiggy broad shrub 3-4 ft. high, with slender glabrous often zigzag shoots: lvs. nearly or quite orbicular in outline, usually not more than 1 in. across, rounded on apex, cut-toothed and often obscurely or shallowly 3- or 5-lobed, bluish-green and glabrous beneath: fls. clear white, about  $\frac{3}{8}$  in. across, many in leafy-peduncled umbels, appearing with the lvs.; petals exceeding the stamens. Turkestan to N. China; one of the plants known in cult. as *S. cratægifolia* and *S. aquilegifolia*.

8. *S. Vanhouttei*, Zabel. Hybrid between *S. trilobata* and probably *S. cantoniensis*, one of the finest of spring-blooming spiræas, giving a fountain of bloom on long arching sts., the fls. larger and more showy than in No. 7: lvs. narrower and somewhat acute, rhombic-ovate to somewhat obovate in outline, often cuneate at base. It bears the name of Louis Van Houtte, noted Belgian horticulturist.

9. *S. japonica*, L. (*S. callosa*, Thunb. *S. Fortunei*, Planch.). Variable shrub, 4-6 ft., the upright bright brown branchlets glabrous or becoming so: lvs. oval to narrowly ovate to oblong-lanceolate, 2-4 in. long, acute or acuminate, doubly sharp-serrate, pale and glabrous beneath: fls. small, about  $\frac{1}{4}$  in. across, pale pink to rose-red, many in aggregated terminal corymbs; stamens prominent. China, Japan; variable.

10. *S. albiflora*, Miq. Little bush, 1-2 ft., with upright branches bearing short lightly pubescent side branchlets: lvs. lanceolate,  $1\frac{1}{2}$ -3 in. long, coarsely simply or sometimes doubly serrate, glabrous: fls. white, about  $\frac{1}{4}$  in. across, with prominent central disk, many in dense terminal nearly flat-topped aggregated corymbs, the central one of which is largest. Japan; summer.

11. *S. Bumalda*, Burv. (*S. japonica* var. *Bumalda*, Bean). Hybrid of *S. japonica* and *S. albiflora*: plants dwarf, 2 ft. or less high: lvs. ovate-lanceolate, 2-3 in. long: fls. bright carmine, often highly colored, sometimes whitish, in large flat corymbs. (*Bumalda* is a personal name: see *Staphylea Bumalda*, page 466.)—Known in cult. mostly in the var. Anthony Waterer, with brilliant carmine fls.

12. *S. conspicua*, Zabel. Hybrid of *S. albiflora* and *S. alba*, forming an upright shrub 3 ft. high with branches dark brown and thinly pubescent but becoming nearly or entirely glabrous: lvs. elliptic or elliptic-oblong,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, very short-petioled, acute, tapering both ways, rather coarsely simply or doubly serrate, strongly veined, glabrous except on veins beneath: fls. pinkish or nearly white, small, about  $\frac{1}{4}$  in. across, in many dense roundish or conical clusters that are usually arranged at maturity in a panicle longer than broad but at first in a more or less expanded aggregate; petals shorter than stamens; summer to autumn.—Other related or similar hybrids are *S. syringæflora*, Lem., and *S. semperflorens*, Zabel.

13. *S. salicifolia*, L. Forming a dense shrub or clump 4-6 ft. high, with yellowish-brown branches that soon become glabrous: lvs. lanceolate to broad-lanceolate to oval or oblong, 1-3 in. long, short-acute, tapering to very short petiole, sharply somewhat doubly serrate, glabrous: fls. light pink or whitish, small, about  $\frac{1}{4}$  in. across, in many crowded clusters aggregate into a pyramidal terminal lightly tomentose panicle; petals much shorter than stamens; late spring and summer. Eu. to Japan.

14. *S. latifolia*, Borkh. (*S. salicifolia* var. *latifolia*, Ait.). MEADOWSWEET. An American representative of No. 13, Newf. to N. C.: lvs. broader and mostly shorter,

broad-oval to obovate: panicle glabrous; fls. white or light blush; stamens and disk purplish; petals shorter than stamens; summer. Native mostly east of the Alleghanies; sometimes planted.

15. *S. alba*, Dur. (*S. salicifolia* var. *paniculata*, Ait.). MEADOWSWEET. Another American representative of No. 13, occurring chiefly west of the Alleghanies, sometimes planted: lvs. narrowly oblanceolate or narrowly oblong: fls. white, smaller than in No. 14, in a pubescent or lightly tomentose leafy panicle; stamens and disk white; petals about as long as stamens; summer.

16. *S. Billiardii*, Herincq. One of the commoner hybrids, offshoot of *S. Douglasii* and *S. salicifolia*: shrub to 6 ft., with erect brown-pubescent nearly simple branches: lvs. oblong to lance-oblong, 2-3 in. long, tapering and mostly acute at apex, gradually tapering to a short petiole, sharply more or less doubly serrate, thinly grayish-tomentose beneath when young but becoming nearly or quite glabrous: fls. bright pink, small, less than  $\frac{1}{4}$  in. across, in long pubescent panicles of which the central member is 2-5 in. long, narrow, and very densely fld.; stamens very prominent: fr. glabrous.—Several similar hybrids or mutants are known.

17. *S. Douglasii*, Hook. Stout shrub to 6-8 ft., the branches reddish-brown and tomentose, making dense patches: lvs. thick, oblong to long-oblong, 1-4 in. long, obtuse or acutish at apex, abruptly contracted to very short petiole, unequally serrate on upper half, essentially glabrous above but densely white-tomentose beneath: fls. deep rose-color, small, less than  $\frac{1}{4}$  in. across, in dense panicles that are usually narrow and elongated; petals one-half as long as stamens: fr. glabrous. B. C. to Calif.; discovered about 100 years ago by David Douglas, botanical explorer.

18. *S. tomentosa*, L. HARDHACK. STEEPLEBUSH. Shrub with erect mostly simple reddish-brown tomentose branches about 4 ft. tall: lvs. mostly ovate in outline, sometimes oval, 1-2 in. long, acute, unequally usually double-serrate, densely yellowish- or tawny-pubescent beneath: fls. pink or purple (a white var.), in narrow dense brownish-tomentose panicles; petals somewhat shorter than stamens: fr. pubescent. E. N. Amer., and often planted.

19. *SIBIRÆA*, Maxim. Two spirea-like Asian shrubs, one of which is more or less planted: the genus differs from *Spiræa* in the 2-seeded follicles connate at base, also in the polygamo-diœcious fls. and narrow entire lvs. (*Sibiræa*: Siberia, where the plants are native.)

*S. lævigata*, Maxim. (*Spiræa lævigata*, L.). Shrub to 5 ft., with stout erect glabrous branches: lvs. alternate, clustered on old shoots, oblanceolate to cuneate-oblong (varying to narrow-lanceolate in var. *angustata*, Rehd.), dull or bluish-green,  $1\frac{1}{2}$ -3 in. long to 5 in. on young shoots, obtuse but apiculate, glabrous, base narrow but semi-clasping: fls. greenish-white, small, many in terminal panicles 2-5 in. long. Siberia.

20. *NEILLIA*, D. Don. About 10 or a dozen ornamental shrubs in China and the Himalayan regions.—Something like *Spiræa* but differs in fls. lacking staminal disks, in the presence of stipules (though caducous); in shining crustaceous seeds which are commonly 5 in each of 2 ovaries, and usually in the more elongated calyx: lvs. alternate, deciduous, more or less lobed: fls. in true racemes which are separate or paniced; calyx prominent, sometimes long-tubular, the 5 lobes exceeding the petals; stamens 10 or more; pistils usually 2 (sometimes 1), with terminal style: fr. a dehiscent not inflated caps. (*Neillia*: Patrick Neill, 1776-1851, secretary Caledonian Hort. Society.)

Calyx-tube tubular and glabrous, pink or whitish.....1. *N. sinensis*  
Calyx-tube short and hairy, whitish.....2. *N. thrysiflora*

1. *N. sinensis*, Oliv. Shrub to 5-6 ft., with brown shedding bark and very slender glabrous twigs: lvs. ovate to oblong-ovate, 2-3 in. long, sharp-pointed or acuminate, usually shallowly lobed, cut-serrate, becoming nearly or quite glabrous, with slender short petioles: fls. pink or whitish, in nodding racemes 1-2 in. long: calyx tubular and glabrous and  $\frac{3}{8}$ - $\frac{1}{2}$  in. long on slender pedicels of equal or greater length; petals broad, usually shorter than the pointed calyx-lobes; late spring to summer. Cent. China.

2. *N. thrysiflora*, D. Don. Mostly lower, with angular nearly or quite glabrous branches: lvs. ovate to oblong-ovate, 2-3 in. long, acuminate, cordate at base, obscurely lobed, cut-serrate, glabrous above and mostly pubescent on veins be-

neath, petiole short and rather slender: fls. in panicked erect racemes or the racemes axillary along the branches, very short-pedicelled, calyx-tube whitish and hairy,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, not tubular, the long-acute lobes exceeding petals. Himalayas.

17. **STEPHANANDRA**, Sieb. & Zucc. Four or 5 graceful ornamental deciduous shrubs in Japan and China, distinguished from Neillia by the open or cup-shaped calyx-tube, stamens persistent, pistil 1 with lateral style, fr. 1- or 2-seeded and only partially dehiscent: fls. small, dull white or greenish. (Stephanan-dra: Greek compound, referring to the crown of stamens.)

Lvs. deeply cut-lobed: stamens 10.....1. *S. incisa*  
Lvs. shallowly 3-lobed: stamens 15–20.....2. *S. Tanakæ*

1. *S. incisa*, Zabel (*S. flexuosa*, Sieb. & Zucc.). Shrub with long flexuose zigzag drooping glabrous or puberulent branches, 6–8 ft. high: lvs. triangular-ovate in outline, 1–3 in. long, long-acuminate, truncate or subcordate at base, many-lobed and often almost to the midrib and the margins doubly cut-serrate, glabrous except on veins beneath: fls. small, about  $\frac{1}{6}$  in. across, few in open short more or less panicked racemes, the slender pedicels much exceeding the fls.; stamens 10. Japan, Korea.

2. *S. Tanakæ*, Franch. & Sav. Stoutier shrub, 5–6 ft.: lvs. larger, triangular-ovate to broad-ovate, long-acuminate, subcordate, usually shallowly 3-lobed, the margins rather coarsely double-serrate, light-colored beneath: fls. larger, shorter-pedicelled, in loose terminal panicles; stamens 15–20. Japan; named from collections by Tanaka.

18. **PHYSOCARPUS**, Maxim. (*Opulaster*, Medic.). NINEBARK. A dozen or more spirea-like shrubs of N. Amer. and N. E. Asia, one of which is frequently planted.—From Spiræa distinguished by the inflated little pods (Physocarp-us: bladder-fruit), glossy often elongated seeds, stipulate lvs.: bark peeling from the branches in strips: lvs. deciduous, alternate, simple but more or less lobed: fls. many, in umbel-like clusters, white or pinkish; stamens 20–40; pistils 1–5, more or less united at base, freely produced and ripening into 2-valved bladdery few-seeded follicles.

*P. opulifolius*, Maxim. (*Spiræa opulifolia*, L.). COMMON NINEBARK. Strong wide-recuring shrub to 10 ft. high, native Que. to Ga. and halfway across the continent, also commonly planted: lvs. mostly ovate in outline, 1–3 in. long, usually more or less distinctly 3-lobed, margins dentate and serrate, glabrous or becoming so: fls. whitish, in corymbs 1–2 in. across in summer on leafy shoots of the season: pods 3–5 from each fl., about  $\frac{3}{8}$  in. long and conspicuous, much exceeding the acute calyx-lobes.—There is a form with yellow foliage.

19. **ARUNCUS**, Adans. GOATS-BEARD. Two or 3 tall perennial herbs in the northern hemisphere, one sometimes planted for its ample open panicles of very numerous small white fls.—Dioecious: lvs. 2–3-pinnate, cauline and basal, long-stalked: fls. nearly or quite sessile on long branches of the panicle; calyx 5-lobed; petals 5, small and narrow; stamens numerous; pistils commonly 3: follicles reflexed, usually with 2 very small dull seeds. (Arun-cus: a Greek word for goat's-beard.)—Usually grown under the name spirea; the *Spiræa astilboides* of gardens (not Maxim.) is *Astilbe astilboides*.

*A. sylvestris*, Kostl. (*Spiræa Aruncus*, L.). Attractive erect branching herb, 4–7 ft., glabrous or somewhat pubescent, with large much-divided lvs.: lfts. ovate to broad-lanceolate, 1–4 in. long, long-acuminate, sharply toothed and serrate: fls. about  $\frac{1}{8}$  in. across, crowded; stamens long-exserted. Eurasia, N. Amer.

20. **GILLENIA**, Moench (*Porteranthus*, Britt.). Two erect perennial herbs of E. N. Amer., adaptable for ornament.—Lvs. 3-foliate or 3-parted, sessile or short-stalked, sharp-serrate or cut, stipulate: fls. bisexual, with showy white or pinkish narrow petals, borne on long pedicels in loose paniculate corymbs; calyx cylindric or deep cup-shaped, somewhat constricted at throat, persistent, with 5 teeth; petals 5, unequal; stamens 10–20, included; pistils 5, opposite



the calyx-lobes, lightly connate but becoming distinct, ripening into 2-4-seeded follicles. (Gillenia: Arnold Gille, Latinized Gillenius or Gilenius, German physician, who wrote on hort. in 1627.)

**G. trifoliata**, Moench. INDIAN PHYSIC. Erect, branching, 2-4 ft. high, glabrous, with slender reddish sts.: lfts. 3, ovate-oblong to lanceolate, 2-3 in. long, long-acuminate, serrate, stipules small and awl-shaped: fls. nearly 1 in. across, with very narrow petals. Ont. to Ga. and Mo.—**G. stipulata**, Trel., differs in having lvs. incised-lobed or -parted and large lf.-like stipules; of similar range.

**21. SORBARIA**, A. Br. Woody or semi-woody plants of about 8 species in N. and E. Asia, one a common ornamental.—Lvs. deciduous, alternate, odd-pinnate, serrulate, stipulate: fls. bisexual, small and numerous in terminal panicles; petals 5; stamens 20-50; pistils 5, opposite the 5 calyx-lobes, somewhat connate, forming several-seeded dehiscent follicles. (Sorbaria: resembling Sorbus in foliage.)

**S. sorbifolia**, A. Br. (*Spiræa sorbifolia*, L. *Schizonotus sorbifolia*, Lindl.). Erect soft-woody bush 3-6 ft. high, spreading freely by suckers, sts. pubescent above: lvs. oblong in outline; lfts. 13-23, lanceolate, long-acuminate, sharp-serrate, often stellate-pubescent beneath when young: fls. white with center reddish or yellowish, about  $\frac{1}{2}$  in. across, in close or dense terminal panicles 4-12 in. long; calyx-tube glabrous; petals rounded, clawed; stamens conspicuous; pistils and frs. glabrous. Ural region to Japan; common in yards and often escaped.—**S. stellipila**, Schneid., is very similar but with lvs. more marked stellate-pubescent beneath, pubescent calyx-tube, pistils and frs.

**22. PRUNUS**, L. STONE-FRUIITS. Trees and shrubs prevailingly of temp. climates mostly in the northern hemisphere, perhaps 150-175 species if the genus is defined broadly, of major importance in pomology and many of them prized for ornament; here are included the plums, cherries, peaches, apricots, and almonds.—Lvs. alternate and simple, deciduous or evergreen, mostly serrate and sometimes bearing glands along the petiole or base of blade; stipules small, caducous: fls. bisexual, white or pink, sometimes solitary but mostly in umbel-like clusters or racemes, usually in spring and often preceding the foliage, the 5 calyx-lobes and 5 petals spreading; stamens many, inserted with the petals on the calyx-tube or hypanthium; pistil normally 1, with undivided style and capitate stigma, superior in the bottom of the calyx-cup, 2-ovuled: fr. a drupe developed from a fleshy pericarp in which is embedded the hard stone formed of the endocarp inclosing usually a single seed, the other ovule having aborted. (Prunus: classical name of the plum.)—The edible part of the fr. is usually the soft juicy outer flesh, but in the almonds the flesh is dry and often cracks at maturity and the kernel or seed is eaten; in many species the frs. are small, acerb and inedible. In N. Amer. 25-30 species are native, some of them of much importance horticulturally. As here defined, Prunus covers Amygdalus, Armeniaca, Cerasus, Laurocerasus, Padus; the key is therefore arranged in six major groups.

1. The Plums: fls. few to several in umbel-like clusters from clustered buds of the previous year (winter-buds), appearing with the lvs. or sometimes just before them: fr. glabrous and glaucous, sulcate, usually with a slender pedicel that remains with it, the stone not prominently furrowed: lvs. convolute or conduplicate in the bud.  
—PRUNOPHORA.

- A. Lvs. broad (as ovate), usually manifestly reticulated and more or less pubescent at least beneath at first: young twigs mostly pubescent: fls. usually 1 or 2 from each bud in the cluster: Eurasian plums. (No. 6 does not belong in this group.)

- B. Pedicels glabrous.

- c. Twigs pubescent: fr. very small, scarcely edible: plant very thorny.....

- cc. Twigs glabrous or soon becoming so: fr. cherry-like, edible: plant little or not at all thorny.....

- BB. Pedicels hairy or pubescent.....

1. *P. spinosa*

2. *P. cerasifera*

3. *P. domestica*

- AA. Lvs. mostly relatively long (as oblong-ovate), not rugose nor reticulated, glabrous or pubescent only on veins beneath, finely serrate: young twigs nearly or quite glabrous: fls. 2 or 3 from each bud in the cluster: Oriental plums.
- B. Pedicel slender, remaining on the fr. .... 4. *P. salicina*
- BB. Pedicel short, usually not adhering to the mature fr. .... 5. *P. Simonii*
- AAA. Lvs. various, mostly coarsely serrate (finely serrate in Nos. 11 and 13), either very broad and short as in Nos. 6 and 7, or relatively narrow or long (as oblong-ovate to oblong-obovate), glabrous or pubescent: young twigs mostly glabrous: fls. sometimes 2 but usually more than 3 from each bud in the cluster: fr. red or yellow, not blue-purple: American plums, difficult to define but recognizable.
- B. Blade of lf. broad-ovate to orbicular, subcordate, glabrous only at maturity. .... 6. *P. subcordata*
- BB. Blade oval or obovate-oval, pubescent beneath. .... 7. *P. maritima*
- BBB. Blade of lf. otherwise.
- C. Foliage heavy and dull; lvs. not shining above, thick, rugose, broad and short-pointed or obtuse.
- D. Fls. small, the petals about  $\frac{1}{16}$  in. long. .... 7. *P. maritima*
- DD. Fls. large, the petals usually  $\frac{1}{16}$  in. or more long.
- E. Calyx-lobes not glandular: lvs. sharp-serrate. .... 8. *P. americana*
- EE. Calyx-lobes glandular: lvs. obtusely serrate. .... 9. *P. nigra*
- CC. Foliage light (peach-leaved group): lvs. shining above, mostly thinnish and not prominently rugose, narrow, and usually long-pointed.
- D. Calyx-lobes not glandular.
- E. Lf.-margins rather coarsely serrulate; lvs. flat or nearly so. .... 10. *P. orthosepala*
- EE. Lf.-margins very closely serrulate; lvs. standing trough-shaped. .... 11. *P. angustifolia*
- DD. Calyx-lobes glandular.
- E. Lf.-margin irregularly and rather coarsely serrate; veins prominent on under surface; upper surface somewhat shining. .... 12. *P. hortulana*
- EE. Lf.-margin finely and evenly serrate; veins beneath not conspicuous; upper surface glossy. .... 13. *P. Munsoniana*
2. The Apricots: fls. sessile or stalked, solitary or in 2's before the lvs. and therefore from winter-buds: fr. pubescent or hairy, the pedicel separating at or before maturity, stone usually furrowed on the margin: lvs. mostly convolute in bud.—ARMENIACA.
- A. Fls. (and fr.) slenderly stalked. .... 14. *P. dasycarpa*
- AA. Fls. sessile or essentially so.
- B. Lvs. very broad, more or less subcordate, abruptly short-pointed: fr. pulpy and soft. .... 15. *P. Armeniaca*
- BB. Lvs. mostly narrow and not subcordate, long-pointed: fr. small, hard, and dry. .... 16. *P. Mume*
3. The Almonds and Peaches: fls. sessile or stalked, solitary, in advance of foliage and therefore from winter-buds: fr. usually pubescent, the pedicel separating at maturity, stone mostly furrowed and pitted: lvs. conduplicate in bud.—AMYGDALUS. PERSICA.
- A. Plants bush-form, grown for the bloom.
- B. Lvs. obovate or broad-ovate, tending to be 3-lobed. .... 17. *P. triloba*
- BB. Lvs. elliptic to lanceolate. .... 18. *P. nana*
- AA. Plants tree-form, grown mostly for fr. or stocks.
- B. Flesh of fr. hard, inedible, splitting to the stone at maturity: lvs. crenate-serrate. .... 19. *P. communis*
- BB. Flesh soft, usually not cracking to stone: young lvs. sharp-serrate.
- C. Lvs. broad- to oblong-lanceolate: stone large and compressed. .... 20. *P. Persica*
- CC. Lvs. narrower, tapering from near base: stone small and nearly spherical. .... 21. *P. Davidiana*
4. The Umbellate Cherries: fls. in umbel-like clusters (mostly solitary in No. 22), usually from winter-buds, with the foliage or immediately preceding it: fr. prevaillingly smooth, small, nearly or quite globular, not sulcate or not strongly so, the slender pedicel usually remaining with it, stone nearly globular and mostly not furrowed: lvs. conduplicate in bud.—CERASUS.
- A. Lvs. tomentose beneath, nearly as broad as long. .... 22. *P. tomentosa*
- AA. Lvs. otherwise.
- B. Plants bush-like or prostrate: winter-buds in 3's, the 2 lateral ones producing pedicellate fls. but the clusters not pedunculate, except abnormally (No. 26 is not to be sought here).
- C. Lf.-margin prominently serrate to the base: fr. red.
- D. Shape of lvs. broad, on the ovate or wide-ovate order. .... 23. *P. japonica*
- DD. Shape of lvs. narrow, on the oblong or lanceolate order. .... 24. *P. glandulosa*
- CC. Lf.-margin entire below middle or at base: fr. black. .... 25. *P. Besseyi*

- BB. Plants tree-like (exception in No. 26): winter-buds single or else on short spurs: fls. pedicellate, the clusters sometimes pedunculate and branched.
- C. Calyx-lobes reflexed.
- D. Fls. mostly in lateral clusters: lvs. longer than broad.
- E. A small plant, bush-like.....26. *P. fruticosa*
- EE. A large plant, distinctly tree-form.
- F. Lf. on the short order, ovate to obovate and abruptly short-pointed, stiff.....27. *P. Cerasus*
- FF. Lf. on the long order,—oblong-ovate and taper-pointed, soft.....28. *P. avium*
- DD. Fls. in terminal and lateral umbelloid bracted clusters: lvs. very broad or nearly orbicular.....29. *P. Mahaleb*
- CC. Calyx-lobes erect or only slightly spreading (not truly reflexed).
- D. Infl. simple, the involucre (bud-scales) at its base not developed or conspicuous.
- E. Lvs. broad—on the wide-ovate or -obovate order.....30. *P. Pseudo-Cerasus*
- EE. Lvs. narrow—on the lanceolate or lance-ovate order.....31. *P. subhirtella*
- DD. Infl. often or usually branched and bracted: bud parts from which it issues enlarged to  $\frac{1}{2}$  in. or more long forming a kind of involucre.
- E. Lvs. glabrous above and beneath.
- F. Teeth of lf. sharp but not prominently aristate: fls. inodorous, white.....32. *P. serrulata*
- FF. Teeth manifestly aristate: fls. fragrant, usually pink.....33. *P. Lannesiana*
- EE. Lvs. hairy or pubescent, at least on veins beneath.
- F. Fls. double, pink; calyx-lobes entire.....34. *P. Sieboldi*
- FF. Fls. single, white or pink; calyx-lobes sharp-serrate.....35. *P. yedoensis*
5. The Racemose Cherries: fls. small, white, in distinct spreading or drooping racemes, terminal on leafy shoots of the season (therefore not appearing in advance of foliage): fr. smooth, small, globular, red or yellow, with thin but manifest pulp: lvs. deciduous, conduplicate.—*PADUS*.
- A. Calyx-lobes persistent at base of fr.: large trees with fls. appearing late, and hard-glossy lvs.....36. *P. serotina*
- AA. Calyx-lobes deciduous: small trees or bushes with very early fls., and soft not hard-glossy lvs.
- B. Fls. about  $\frac{1}{2}$  in. across, in wide-spreading or drooping racemes; petals twice longer than stamens.....37. *P. Padus*
- BB. Fls. mostly smaller, in upright or ascending racemes (at first); petals little if any exceeding stamens.....38. *P. virginiana*
6. The Laurel Cherries: fls. small to medium, white, in racemes from the axils of last year's lvs. and from the terminal buds of last year's growth, appearing in spring or summer: fr. globular or pointed or somewhat 3-lobed, small, dry: lvs. persistent, thick and stiff, conduplicate.—*LAUROCERASUS*.
- A. Racemes exceeding the lvs., and the lvs. crenate-dentate.....39. *P. lusitanica*
- AA. Racemes equaling or less than the lvs.
- B. Calyx-lobes 3-toothed, very short and broad: lvs. usually remotely toothed.....40. *P. Laurocerasus*
- BB. Calyx-lobes undulate, prominent and rounded: lvs. entire.....41. *P. caroliniana*
- BBB. Calyx-lobes entire, acute and minute: lvs. broad, spiny-toothed to entire.
- C. Lvs. rounded or emarginate at apex, holly-toothed.....42. *P. ilicifolia*
- CC. Lvs. acute at apex, entire or only remotely shallow-toothed.....43. *P. Lyoni*
1. *P. spinosa*, L. *SLOE*. *BLACKTHORN*. Thick-topped very thorny suckering hardwooded tree or shrub, 10–15 ft. high, planted for ornament; young shoots pubescent: lvs. small and very numerous, mostly less than 2 in. long, obovate, oval, ovate or with oblong combinations of these forms, obtuse or nearly so, closely serrate, pubescent on veins beneath but becoming glabrous: fls. small, clear white,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, borne singly or sometimes in pairs in early spring, the slender glabrous pedicels less than  $\frac{1}{4}$  in. long: fr. harsh, globular, about  $\frac{1}{2}$  in. diam., blue becoming black, often persisting until winter. Eurasia; frequently planted for its profuse early bloom, its dense head of foliage, and abundant ornamental frs.; there are purple-leaved and double-fl. kinds.
2. *P. cerasifera*, Ehrh. *CHERRY PLUM*. *MYROBALAN PLUM*. Slender twiggy tree to 20 ft. or more; seldom thorny, sometimes grown for its edible fr. but known mostly in this country as a stock for other plums and often forming thickets when the budded tops have failed or appearing in orchards; young shoots glabrous, or very soon becoming so: lvs. small and thin, light green, usually not exceeding 2 in. long, short-ovate to somewhat obovate, short-pointed, finely serrate, retaining light pubescence on veins beneath: fls. usually clear white, 1 in. or less across, borne singly or 2 or 3 together, often clustered on spurs, the slender glabrous pedicels seldom  $\frac{1}{2}$  in. long: fr. small, mostly 1 in. or less diam., globular and cherry-like,

red or yellow, the flesh soft, juicy and sweet. Probably native in S. W. Asia; it runs into several forms.—Var. *Pissardi*, Koehne, is a common purple-leaved form; introduced to France by M. Pissard, gardener to the Shah of Persia. The Marianna plum is supposed to be a hybrid between *C. cerasifera* and one of the native plums.

3. *P. domestica*, L. COMMON OR EUROPEAN PLUM. PRUNE. Strong-growing small tree with thick pubescent twigs, not thorny except sometimes in run-wild forms, planted in orchards for the fr.: lvs. large, blade 2-4 in. long, ovate to obovate, thick and rugose, dull green, short-pointed to obtuse, coarsely and irregularly serrate, thin-hairy or scabrous above and pubescent beneath: fls. white or cream-color, 1 in. or less across, mostly clustered on spurs but sometimes single or 2-3 together, the mostly pubescent pedicels  $\frac{1}{2}$  in. or less long: fr. very variable in size, shape, color and texture, often blue-purple, representing the range of garden plums. Probably from S. W. Asia, but known only as a cultigen and escape.—There are double-fl'd. and other modified forms. Var. *insititia*, Bailey. DAMSON. BULLACE PLUM. Tree mostly smaller and the head more compact: lvs. smaller and more firm in texture: fr. small, ovoid, borne usually in clusters.

4. *P. salicina*, Lindl. (*P. triflora*, Roxb., ex Bailey). JAPANESE PLUM. Strong-growing small tree, grown for the edible frs., with glabrous parts, the reddish or brown twigs mostly shining: lvs. oblong-obovate to oblong-ovate, 3-4 in. long, not prominently rugose, usually shining above, abruptly but prominently pointed, closely blunt-serrate, dull and usually glabrous beneath: fls. white,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, few (commonly 2 or 3) from each bud but appearing clustered on the spurs, the slender glabrous pedicels  $\frac{1}{2}$  in. or less long: fr. various, yellow or light red, never blue-purple, tending to be pointed at apex. China; now represented in orchards by many vars.

5. *P. Simonii*, Carr. APRICOT PLUM. Straight-growing narrow-topped tree, planted for its frs., the glabrous branches erect: lvs. somewhat peach-like, long-oblanccolate to lance-obovate, 3-4 in. long, rather thick in texture, dull, very veiny but glabrous beneath, short-pointed, obtusely serrate, conduplicate or trough-like in position: fls. white, about  $\frac{3}{4}$  in. across, single or 2 or 3 together, on short glabrous pedicels: fr. 1-2 in. diam. crosswise, flattened lengthwise, very firm in texture and with strong aroma, smooth, maroon-red, deeply sutured, flesh yellow and clinging to the small rough nearly orbicular stone, pedicel usually not adhering. China, but not known wild; seeds sent to France before 1872 by Eugene Simon.—The Wickson plum is apparently a hybrid derivate from it.

6. *P. subcordata*, Benth. Stout tree to 25 ft., or sometimes a bush, planted sometimes for ornament and also for the edible fr., the twigs glabrous or pubescent and sometimes spiny: lvs. broad-ovate to orbicular, usually subcordate at base, 1-3 in. long, sharply and often doubly serrate, rather thick in texture, pubescent beneath but becoming nearly or quite glabrous: fls. white fading to rose,  $\frac{2}{3}$  in. across, in advance of lvs., 2-4 together, on glabrous or pubescent pedicels  $\frac{1}{2}$  in. or less long: fr. globular or short-oblong, dark red or yellow, often more than 1 in. diam., subacid flesh clinging to flat smooth or slightly rough stone. Calif. and Ore., sometimes planted about settlements.—Var. *Kelloggii*, Lem. SISSON PLUM. A form or race with larger ovoid yellow or red fr. with soft and agreeable flesh: more slender in growth; lvs. usually not cordate and more glabrous.

7. *P. maritima*, Wang. BEACH PLUM. Variable species, usually a straggling seldom thorny bush, but becoming tree-like when planted away from the coast, the young growth slightly pubescent, planted for ornament and rarely for the edible fr.: lvs. oval or obovate-oval, 1-2 in. long, short-acute to nearly obtuse, closely serrulate, dull green, more or less pubescent beneath: fls. numerous, white, about  $\frac{1}{2}$  in. across, in few-fl'd. umbels preceding the foliage, pedicels  $\frac{1}{4}$ - $\frac{1}{2}$  in. long and mostly pubescent: fr. depressed-globular, about  $\frac{1}{2}$  in. or more diam., deep glaucous-purple, sweetish, the flesh free from the cherry-like stone. Beaches and near the coast, N. B. to Va.; it has given rise to a tree-like var. with large and agreeable fr.: promising to the plant-breeder.

8. *P. americana*, Marsh. Twiggy usually thorny tree, 20-30 ft., or bush-like, with glabrous branchlets, yielding pomological vars.: lvs. obovate to oblong-ovate, 3-4 in. long, acuminate, thickish, not glossy, margins sharp-serrate or almost incised, strongly reticulated beneath and mostly pubescent on the veins, the petiole usually without glands: fls. rather large, about 1 in. across, in small umbel-like clusters in advance of foliage, the calyx-lobes entire and pubescent within, the pedicels glabrous and about  $\frac{1}{2}$  in. long: fr. mostly small and hard,  $\frac{3}{4}$  in. diam. but sometimes much larger and excellent in flavor, yellow or red, glaucous, the stone turgid. S. New England south and west, a common plant in thickets.—It has given



rise to many named vars., as Blackhawk, Forest Garden, De Soto, Rollingstone, Hawkeye. Var. *lanata*, Sudw. (*P. lanata*, Mack. & Bush), has lvs. and twigs soft-pubescent or even tomentose; it yields Wolf, Van Buren, Quaker, and other pomological vars.

9. *P. nigra*, Ait. (*P. americana* var. *nigra*, Waugh). The northern representative of No. 8, in Canada and southward to New England, N. Y., O., and N. Ill. and northwestward: lvs. mostly broader, with crenate-serrate margins and biglandular petiole: fls. larger, on dark red pedicels, white changing to pink, the calyx-lobes glandular-serrate and glabrous on the inside: fr. mostly oblong, orange-red, the stone large and flat.—It yields a few large-fruited vars., as Cheney, Itasca, Oxford.

10. *P. orthosepala*, Koehne. Of doubtful nativity and botanical standing, probably from Kans. or Tex., supposed to be represented in some of the pomological vars.: much-branched spreading bush, 4-5 ft.: lvs. oblong-lanceolate to obovate-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, not conduplicate, acute or acuminate at apex, narrowed at base, margins with acute or obtusish often callous-tipped serratures, bright green and somewhat shining above, glabrous or with few scattered hairs beneath, petiole with 2 glands or glandless: fls. white, pink with age, about  $\frac{1}{2}$  in. broad, 3-4 together in advance of foliage, on glabrous pedicels; calyx-lobes ciliate on margin: fr. globose, about 1 in. diam., red with white dots, glaucous, the stone oval and obscurely roughened.

11. *P. angustifolia*, Marsh. CHICKASAW PLUM. Twiggy tree to 20 ft., or a bush, with zigzag hard reddish glabrous branches, forming dense thickets in the wild, yielding a few pomological vars.: lvs. lanceolate to oblong-lanceolate, 1-2 in. long, conduplicate or trough-like, often clustered on spurs, shining, narrowed at both ends, finely close-serrate, glabrous or slightly pubescent on nerves beneath, petiole biglandular at top: fls. white,  $\frac{1}{2}$  in. across, preceding foliage, 2-4 together, on glabrous pedicels  $\frac{1}{2}$  in. or less long; calyx-lobes not glandular: fr. small and early, about  $\frac{1}{2}$  in. diam., nearly globular, cherry-like (sometimes called "mountain cherry"), red or yellow and dotted, thinly glaucous, flesh soft and adhering to small rough stone. Del. south and west.—Caddo Chief is of this species. Var. *Watsoni*, Waugh (*P. Watsoni*, Sarg.). SAND PLUM. Bush 3-6 ft., with very zigzag twigs, lvs. smaller and less serrate, fls. smaller, fr. thicker-skinned. Dry regions, Kans. south and southwest (named in compliment to Dr. Louis Watson, of Kans.); yields Strawberry, Red and Yellow Panhandle, and other pomological vars. Var. *varians*, Wight & Hedr. Freer and larger grower than *P. angustifolia*, lvs. and pedicels longer, stone usually more pointed at apex. Okla. and Tex.; gives rise to Yellow Transparent, Coletta, and others.

12. *P. hortulana*, Bailey. HORTULANA PLUM. Upright tree not sprouting from the root or forming thickets, becoming 20-30 ft. tall, yielding many pomological vars.: lvs. oblong-obovate to ovate-lanceolate, but mostly on the oblong order (sides parallel), blade 3-4 in. long, long-acuminate, rather broad or rounded at the base, yellowish-green, glabrous but dull or only little shining above, nearly or quite glabrous and prominently veined beneath, margins coarsely and unequally serrate or crenate-serrate, petiole with 1, 2, or more glands near top: fls. white, about  $\frac{1}{2}$  in. across, mostly preceding foliage, 2-4 or more, the pedicels glabrous; calyx-lobes about as long as tube, margins glandular: fr. globose or short-oblong, 1 in. or less diam. (but larger in cult. vars.), red or yellow and usually white-dotted, with little if any bloom. Ky. and Tenn. to Kans.—Yields vars. Golden Beauty, Wayland, Kanawha. Var. *Mineri*, Bailey, well represented in the Miner plum, has darker, duller, thicker lvs. mostly obovate in outline, and a late very firm fr.: approaches *P. americana* in appearance.

13. *P. Munsoniana*, Wight & Hedr. WILD GOOSE PLUM. Stout tree suckering and producing dense thickets: lvs. thinner than in No. 12, oblong-lanceolate to lanceolate to oval, often standing conduplicate or trough-shaped, glossy above and not prominently veined beneath, the margins finely and evenly serrate, petiole usually biglandular near top: fls. white,  $\frac{1}{2}$  in. or more across, 2-4 together mostly preceding the lvs., the calyx-lobes glandular: fr. globular to oval, about  $\frac{1}{4}$  in. long, bright red or yellowish, slightly glaucous, with many pale dots. Ky. to Kans. and Tex.; bears the name of T. V. Munson, Denison, Tex., 1843-1913, horticulturist, authority on Vitis.—Source of Wild Goose, Newman, Robinson, and other plums.

14. *P. dasycarpa*, Ehrh. BLACK APRICOT. Small apricot-like tree, 12-20 ft., with glabrous purplish branchlets: lvs. rather small and plum-like, the blade  $2\frac{1}{2}$  in. or less long, elliptic-ovate to oval, short-pointed, thin and dull green, closely serrate, more or less pubescent on veins beneath, the slender petiole 1 in. or less long and with or without glands: fls. 1 in. or more across, white, single or in 2's or 3's in advance of foliage, the pubescent slender pedicels about  $\frac{1}{4}$  in. long: fr.

globular, plum-like,  $1\frac{1}{2}$  in. diam., pubescent and dark purple, with soft sourish flesh; stone pubescent. Known only in cult.; by some thought to be native in N. E. Asia, by others supposed to be hybrid between apricot and *P. cerasifera*; infrequent.

15. *P. Armeniaca*, L. (*Armeniaca vulgaris*, Lam.). COMMON APRICOT. Small tree with reddish bark and glabrous twigs: lvs. ovate to round-ovate, sometimes subcordate, blade 2-3½ in. long, abruptly short-pointed, closely and mostly obtusely serrate, glabrous above, pubescent on veins beneath, the petioles with conspicuous glands: fls. pinkish or nearly white,  $\frac{3}{4}$ -1 in. across, single and sessile or practically so, much in advance of foliage: fr. variable, pubescent but becoming nearly smooth at maturity, roundish but usually somewhat flattened, yellow overlaid with red, the flesh firm and sweet, mostly free from the flat ridged stone. China; once thought to have come from Armenia.—There are many races; the Russian apricots are very hardy mostly small-fruited kinds.

16. *P. Mume*, Sieb. & Zucc. JAPANESE APRICOT; known as Plum in Japan and extensively planted for its very early bloom: small tree; bark gray or greenish and lvs. grayish-green: lvs. smaller than in No. 15, narrow-ovate to roundish-ovate, long-pointed, rounded or tapering at base, finely and sharply serrate, more or less scabrous above, lighter-colored and pubescent beneath (or essentially glabrous in the usual cult. forms, var. *tonsa*, Rehd.), the petioles usually with glands: fls. sessile or nearly so, fragrant, white or pink, in many sizes and often full double, usually in advance of foliage: fr. mostly smaller than that of No. 15, yellow or greenish, the flesh dry and clinging to the pitted stone. Japan (Mume is a Japanese name); planted in this country mostly in a few fr.-bearing vars. as the Bungo or Bongoume apricots.

17. *P. triloba*, Lindl. FLOWERING ALMOND. Bush, sometimes becoming tree-like and 10 ft. or more tall, twigs nearly or quite glabrous, grown for its showy bloom which appears just in advance of the foliage: lvs. broadly ovate to obovate, 1-2 in. long and twice as large on verdurous shoots, tending to be trilobate, abruptly pointed, coarsely and sharply double-serrate, lightly hairy on both surfaces: fls. clear pink, sometimes white, 1-1½ in. across, in the cult. material mostly double or semi-double, solitary, short-pedicelled; calyx-tube hairy inside between the stamens: fr. small, red, hairy but becoming glabrous, seldom seen. China; common in cult., usually grafted on other stock.—*P. Arnoldiana*, Rehd., is a hybrid of *P. triloba* by *P. cerasifera*, produced at the Arnold Arboretum: differs from *P. triloba* in white fls. appearing with lvs., lvs. less coarsely and scarcely doubly serrate, not trilobate, fr. larger, less hairy and more succulent.

18. *P. nana*, Stokes. RUSSIAN ALMOND. Hardy bush 3-5 ft. high, known in cult. mostly as an ornamental but introduced into this country also as a fr. plant; branchlets glabrous: lvs. stiffish and narrow, 2-3 in. long, elliptic-lanceolate to oblanceolate, the bigger ones 1 in. broad but usually less than ½ in., obtuse or scarcely pointed, gradually narrowed to a short petiole, sharp-serrate, glabrous, much lighter-colored beneath: fls. solitary or paired, sessile or nearly so, appearing with the foliage, pink to white, about ¾ in. across, the calyx-tube prominent and nearly ¼ in. long: fr. ovoid, small and hard, bitter (but improved vars.), about ¾ in. long, densely pubescent, with a wrinkled sharp-pointed somewhat cordate stone. S. Russia, E. Eu., and Asia.

19. *P. communis*, Fritsch (*Amygdalus communis*, L. *Prunus Amygdalus*, Stokes). ALMOND. Tree, size of peach-tree, with light-colored glabrous branchlets, grown sometimes as an ornamental but chiefly (in Calif.) for the "almonds" (stones with the edible seed): lvs. firm, oblong-lanceolate, 3-4 in. long, acuminate, very closely crenate-serrate, glabrous, more or less shining above, lighter beneath, the petiole usually gland-bearing above: fls. large and showy, 1-1½ in. and more across, pink, solitary, sessile, appearing before or with the early foliage: fr. large, 1½ in. and more long, oblong-ovoid and compressed, pubescent, the flesh hard and splitting at maturity disclosing the shallow pitted stone. Probably Asian, perhaps indigenous in the Medit. region, now widely cult. and often escaped.—Bitter almonds, as distinguished from sweet almonds, are kinds in which the kernel is bitter; these kinds are employed mostly in the manufacture of prussic acid and extracts. The sweet or edible almonds may be either hard-shell or soft-shell; the tendency is to breed vars. with thinner walls in the stone, as the paper-shells. There are ornamental forms of the almond-tree, as weeping, variegated, double-flid.

20. *P. Persica*, Sieb. & Zucc. (*Amygdalus Persica*, L. *Persica vulgaris*, Mill.). PEACH. Small tree with glabrous twigs, grown extensively for the thick-fleshed fr., and there are many ornamental kinds: lvs. oblong-lanceolate to broad-lanceolate, 4-9 in. long, acuminate, finely sharp-serrate when small or young, otherwise variously coarsely crenate-serrate, glabrous, shining above and somewhat lighter

beneath, the petiole and sometimes the lower margins usually gland-bearing: fls. solitary, sessile, in advance of foliage, pink,  $\frac{1}{2}$ –2 in. across, the petals in some races only about  $\frac{1}{4}$  in. long and in others very large, much-expanded and showy: fr. widely variable in size and shape, 1–3 in. and more diam., pubescent, yellow or red, flesh white or yellow, stone very hard and deeply pitted. China, but once thought to be from Persia (whence the names *Persica* and *peach*).—There are purple-leaved, dwarf, double-fl., and other ornamental races; also hybrids with the almond. Var. *nucipersica*, Schneid., the *NECTARINE*, has fr. smooth at maturity, like a plum. Var. *platycarpa*, Bailey, *FLAT PEACH*, has fr. much flattened endwise, often nearly as flat as a watch; the *Peen-to peach* belongs here.

21. *P. Davidiana*, Franch. A very early-flowering willow-leaved small tree grown for ornament where spring frosts do not destroy the bloom or the fl.-buds are not killed by winter, and sometimes used as a stock; branchlets glabrous: lvs. firm, 3–5 in. long, lanceolate, tapering from near the base into very long narrow points, finely very sharp-serrate, glabrous, much lighter colored beneath, the slender petiole often with undeveloped glands: fls. white, bluish or light pink, 1 in. or more across, solitary, sessile: fr. nearly globular, about 1 in. diam., with prominent suture, grayish or yellowish, pubescent, the flesh whitish and dry and free from the small nearly spherical stone. (Abbé David, page 327.) China.

22. *P. tomentosa*, Thunb. Compact bushy-topped hardy small tree or very large shrub with heavily pubescent young growth, grown for ornament but likely to yield pomological forms: lvs. broad-oval to -obovate, 1–2½ in. long, thick and dull green, abruptly contracted to short point but the small ones on spurs often obtuse, unequally serrate, very short-petioled, rugose above and tomentose beneath: fls. mostly 1 or 2 or else clustered on spurs, nearly sessile, about  $\frac{3}{4}$  in. across, petals white or tinted, calyx red, appearing just before the lvs.; calyx-lobes erect or only slightly spreading: fr. size of cherry, globular, light red, slightly hairy. China, Manchuria, Japan; in several vars.

23. *P. japonica*, Thunb. *DWARF FLOWERING CHERRY*. One of the three little plants grown for ornament under the name of "flowering almond," the others being Nos. 24 and 17; the two former are sometimes listed under the name *P. sinensis*; bush, 4–5 ft., growths glabrous: lvs. broad, 1–2 in. long, ovate, acuminate with acute apex, sharply and often doubly serrate, very short-petioled, dull green, glabrous or with a few hairs on veins beneath: fls. bluish or pink, about 1 in. across, sometimes solitary but usually 2 or 3 together, short-pedicelled, appearing just before or with the foliage: fr. about globular, not appearing in cult. as the fls. are usually double,  $\frac{1}{2}$  in. diam., light bright red. China; known in several forms, but apparently little grown now.

24. *P. glandulosa*, Thunb. The second species of *DWARF FLOWERING CHERRY* or Flowering Almond and the common one in cult.: lvs. 2–3½ in. long, on the oblong order with sides nearly parallel for a distance or of nearly equal width, gradually tapering above but not acuminate, apex blunt, more crenate-serrate, firmer: fls. bluish, pink, or white, usually double in cult. China; cult. in several forms.

25. *P. Besseyi*, Bailey. *SAND CHERRY*. Little bush with glabrous growths, 1–4 ft. high, diffuse or prostrate, ornamental and also yielding good edible fr.: lvs. elliptic to oval to somewhat oblanceolate, 1–3 in. long, spreading, thick, apex obtuse or only short-acute, tapering to slender petiole, finely appressed-serrate, glabrous, shining above and lighter-colored beneath; stipules on strong shoots large and serrate: fls. few or several, profuse, about  $\frac{1}{2}$  in. across, white, slender-pedicelled, appearing with the early foliage: fr. nearly globular, often with short point, about  $\frac{1}{2}$  in. diam. and larger in some forms, black or mottled, bitter and astringent but often sweet and palatable. Plains, Man. south; named in compliment to Chas. E. Bessey, 1845–1915, professor of botany in the Univ. of Neb., who had much to do with popularizing the large-fruited forms for food.—The species has been used as a dwarf stock and also in hybridizing. The related *P. pumila*, L., a taller more upright plant with spatulate or narrowly oblanceolate lvs., may be found in collections of ornamentals; it is native on shores from N. J. and Wis. north.

26. *P. fruticosa*, Pall. (*P. Chamæcerasus*, Jacq.). *EUROPEAN DWARF or GROUND CHERRY*. Low spreading bush, 1–3 or 4 ft. high, with glabrous growths, planted for its mound-like shape and profuse fls., and often grafted on tall stocks to make a drooping compact head: lvs. oval to elliptic to oblanceolate or narrow-obovate, 1–2 in. long or somewhat longer on strong shoots, apex blunt or short-acute to acuminate on vigorous growths, closely crenate-serrate, shining above, at first somewhat hairy beneath, narrowed to petiole: fls. white,  $\frac{3}{4}$  in. across, in few-fl.



somewhat branching clusters with the young foliage: fr. size of large pea, globular, deep reddish-purple, sour. Continental Eu., Siberia.

27. *P. Cerasus*, L. SOUR CHERRY. Small round-headed bushy-topped tree, with gray tight bark, glabrous growth, suckering from the root, planted mostly in orchards but with good ornamental forms: lvs. short-ovate to ovate-obovate, 3-4 in. long, abruptly short-pointed, stiff in texture, light or gray-green, doubly serrate, petiole or base of blade with more or less undeveloped glands, glabrous or with sparse hairs on veins beneath: fls. white, 1 in. or somewhat less across, appearing with the first foliage or slightly in advance of it, in small clusters from lateral buds of which the scales are small, on slender glabrous pedicels 1 in. or more long; calyx-tube little if any constricted at top, the lobes crenate: fr. globular or depressed, red, soft-fleshed, sour, the stone globular. Eurasia.—Here defined to include *P. acida*, Ehrh., and other botanical forms; these forms may represent either different original species or divergencies resulting from cult. The Morello, Amarelle, and other sour or pie cherries are here included. There are races of differing stature (some drooping), lf. forms, double-fl., and others.

Var. *semperflorens*, Loud. EVERBLOOMING or ALL-SAINTS CHERRY, with slender drooping habit and fls. in summer and autumn on leafy shoots of the season: lvs. small: often worked on upright stock.

28. *P. avium*, L. SWEET CHERRY. Tall big tree with strong central leader, not suckering, with red-brown birch-like bark defoliating in transverse strips, with glabrous growth, planted extensively in orchards and, in the Mazzard, used as stock in nurseries: lvs. on the oblong-elongate order, usually oblong-ovate to oblong-obovate and gradually taper-pointed, blade 4-6 in. long, soft in texture and color, hanging limp on the young growths, margins doubly acute-glandular-serrate at first but becoming more or less obtuse-serrate, the petiole usually bearing 1 or more large glands near top: fls. white, about 1 in. across, appearing with the first lvs. from clusters of buds on lateral spurs, the inner glandular bud-scales large and persistent for a time, on glabrous pedicels about 1 in. long; calyx-tube constricted near top, the lobes entire: fr. globular or somewhat depressed or in some forms heart-shaped, yellow or red, with mostly sweet flesh or bitterish on run-wild trees. Eurasia.—There are ornamental forms, as weeping, cut-leaved, variegated, double-fl. The main pomological races known in this country are three: Var. *Juliana*, Bailey. HEART CHERRIES. Fr. heart-shaped with soft flesh, as in Black Tartarian, Governor Wood, Black Eagle. Var. *duracina*, Bailey. BIGARREAU CHERRIES. Fr. firm breaking flesh and mostly of light color, as in Napoleon, Yellow Spanish, Windsor. Var. *regalis*, Bailey. DUKE CHERRIES. Fr. acid; considered by some to be a race of hybrids between Nos. 28 and 29.

29. *P. Mahaleb*, L. MAHALEB or ST. LUCIE CHERRY. Small slender green-twigged small tree with thin hard glabrous branchlets (that may be pubescent when growing), cult. as a stock on which to bud other cherries and also somewhat for ornament: lvs. light green,  $1\frac{1}{2}$  to about  $2\frac{1}{2}$  in. long, broad-ovate to orbicular, abruptly very short-pointed or even blunt, often subcordate, closely crenate-serrate, the short petiole often bearing 1 or 2 glands: fls. small,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, white, very fragrant, numerous, in small terminal and lateral umbel-like lengthening but short racemes with lvs. or bracts of the season at their base, appearing with the early foliage and also later: fr. ovoid, about  $\frac{1}{4}$  in. long, black (sometimes yellow), with little flesh, on long pedicels. (Mahaleb is an Arabic name). Cent. and S. Eu.; often escaped in N. Amer.—There are many forms or races differing in color of fr., shape and habit of top, modified foliage; also hybrids with No. 28 and probably others.

30. *P. Pseudo-Cerasus*, Lindl. Small close-headed tree to 25 ft. high, with gray to purplish thinly hairy branchlets, much planted in the Orient for fr. and now introduced into this country for the same purpose and as a parent for hybridizing: lvs. ovate to very broad-ovate, 3-5 in. long, mostly acuminate but sometimes abruptly pointed, sharply double-serrate, broad or rounded at base, dull, sparsely hairy on veins above and beneath, the short petiole commonly biglandular: fls. white,  $\frac{3}{4}$ -1 in. across, fragrant, in advance of the foliage or just with it, 2-5 in a cluster from winter-buds of which the scales are not enlarged, on very hairy pedicels  $\frac{3}{4}$  in. or less long: fr. very early,  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam., globular with usually somewhat flattened ends but more or less apiculate, red, with sweet tender flesh, the stone compressed and with ridges at one edge. China; the name *Pseudo-Cerasus* was long mistakenly applied to the oriental flowering cherries, Nos. 32-35.

31. *P. subhirtella*, Miq. ROSEBUD CHERRY. Large shrub or small bushy tree to 25 ft., with brown glabrous or lightly hairy branches and gray bark, planted for its profuse handsome early bloom: lvs. lanceolate to ovate-lanceolate or ovate,  $1\frac{1}{2}$ -2 in. long (to 3 in. on strong shoots), abruptly acuminate or short-pointed,



narrowed to base, doubly sharp-serrate, dull, hairy on veins beneath, the short petioles and lower margins usually without developed glands: fls. pink, 1 in. across, 1, 2, or 3 normally from a winter-bud in advance of foliage and the bud-scales not enlarging, petals pink to nearly white and emarginate, calyx reddish and narrow, cylindric or somewhat enlarged at base, pedicels 1 in. or less long and hairy: fr. globular, about  $\frac{1}{2}$  in. diam., shining black. Japan; not recognized wild. —A much larger tree, making massive wide-spreading branches and larger lvs., is var. *ascendens*, Wils., native in Cent. China and probably elsewhere; apparently little planted in this country.

Var. *pendula*, Tanaka (*P. pendula*, Maxim.). DROOPING ROSEBUD CHERRY. Small tree with crooked drooping branches: lvs. mostly larger, the basal glands usually large. Japan; not known wild.

32. *P. serrulata*, Lindl. JAPANESE FLOWERING CHERRY. Tree of medium size, with smooth dark chestnut-brown bark and glabrous branchlets, sometimes planted for its showy fls.: lvs. unfolding greenish-brown, large, 3–6 in. long, ovate to narrow-ovate, abruptly long-acuminate, deep green, with prominent acute or short-aristate serratures, glabrous, glaucous beneath, the glabrous petiole with 1 or 2 small glands or none: fls. white, double or semi-double, not fragrant, 1–1½ in. across, in 3–5 fld. clusters which are on long or short peduncles and which bear large firm-briate bracts, appearing with the foliage or just in advance of it; pedicels 1 in. or less long, glabrous; calyx-tube and style glabrous: fr. size of small pea, black. China, Japan, Korea; it yields many kinds, some of them pink-fld.; var. *spontanea*, Wils., is the wild native form in Japan, with single small white or pink fls.

Var. *sachalinensis*, Makino (*P. Sargentii*, Rehd.). Hardier in cult. in this country: a larger tree, with broader and more coarsely serrate lvs., the serratures less pointed although often gland-tipped: fls.  $\frac{1}{2}$ –1¼ in. across, rose, pink or nearly white, not double. N. Japan, Korea; grown in many kinds.

33. *P. Lannesiana*, Wils. JAPANESE FLOWERING CHERRY. Doubtfully distinct; parent apparently of the greater number of Japanese double-flowering cherries, distinguished by pale gray bark, lvs. unfolding green or only slightly reddish, long-aristate serratures of lvs. and its fragrant mostly pink fls.: it makes a large tree 30 ft. or more high. Japan; received in Eu. about 1870 by M. Lannes; yields many cult. forms.

34. *P. Sieboldi*, Wittm. JAPANESE FLOWERING CHERRY. A double-fld. cherry much like No. 33 but the lvs. bronzy when young, densely soft-pilose beneath, caudate-acuminate, sharply and often obscurely double-serrate with small sharp teeth; petiole hairy, usually with 1 or 2 small glands: fls. double or at least semi-double, normally pink, the peduncle scarcely evident when they appear before the foliage but elongated when they come with the foliage; calyx-lobes entire; style hairy at base. (P. F. von Siebold, page 87.) Japan; not known in native state.

35. *P. yedoensis*, Mats. Differs from No. 34 in pale green young lvs. and calyx-lobes sharp-serrate; from No. 32 in the hairy pedicels and style as also the veins and ribs on the under side of lvs. and also usually the outside of the calyx: fls. single (a double var.), white to pink, slightly fragrant, in clusters or sometimes only 2, mostly in advance of foliage but sometimes with it: lvs. obovate to broadly ovate-elliptic, 3–5 in. long, acuminate, doubly serrate with sharp gland-tipped serratures; bark smooth pale gray. Japan, but unknown native; much planted in parks and temple grounds, and to be expected in the living collections of Japanese cherries in this country.

36. *P. serotina*, Ehrh. WILD BLACK CHERRY. Great tree, reaching 100 ft. in height and 4–5 ft. diam., with glabrous branchlets and bitter-aromatic qualities, sometimes planted for shade and ornament: lvs. oblong to oblong-lanceolate to oval, 2–6 in. long, stiff and firm at maturity, acuminate, mostly narrowed at base, serrate with appressed incurved callous teeth, shining above, lighter-colored and nearly or quite glabrous beneath: fls. appearing when the lvs. are half or more grown, white, about  $\frac{1}{2}$  in. across, many in racemes 4–6 in. long on short lateral shoots of the season; calyx with remains of stamens, persistent: fr. nearly globose,  $\frac{1}{2}$  in. or less diam., purple-black, with thin flesh, in late summer and autumn. N. S. to Fla. and westward.

37. *P. Padus*, L. EUROPEAN BIRD CHERRY. Small to medium-sized tree, becoming 30 ft. and more tall, with growing parts pubescent or glabrous, planted for ornament: lvs. elliptic or oval to oblong-ovate and sometimes somewhat obovate, 2–4 in. long, short-acuminate, rounded or subcordate at base, closely sharp-serrate, dull green above, glabrous beneath except on veins, the petiole usually biglandular at very apex: fls. white and fragrant, about  $\frac{1}{2}$  in. across, on drooping or wide-

spreading racemes 3-6 in. long that terminate short lateral growths of the season, appearing with the full foliage; petals large and expanding, twice exceeding the stamens: fr. globular, about  $\frac{1}{4}$  in. diam., black, bitter; stone corrugated with ridges and cross-ridges. (Padus is the ancient Greek name for this cherry.) Eu., Asia; known in cult. under several forms, as drooping, variegated, double-fl.

38. *P. virginiana*, L. (*P. nana*, DuRoi, not Stokes). CHOKE CHERRY. Much like No. 37, but a bush or only occasionally a small tree, fls. earlier and smaller and less fragrant, racemes closer and less showy and at first ascending or upright, petals little if any exceeding stamens, fr. deep red (varying to yellow), stone not corrugated. Variable native species of wide distribution, not much planted.

39. *P. lusitanica*, L. (*Laurocerasus lusitanica*, Roem.). PORTUGAL-LAUREL. Evergreen large shrub or becoming tree-like, sometimes 40 ft. or more tall, with dark-colored glabrous growth, planted S. for ornament and sometimes raised as tub specimens: lvs. thick and leathery, oblong-ovate to ovate-lanceolate, 2-4 in. long, acuminate, crenate-dentate, glabrous, glossy above, lighter-colored or fulvous beneath: fls. white, about  $\frac{1}{2}$  in. across, in racemes 5-10 in. long that much exceed the lvs., in late spring and early summer; calyx-lobes entire: fr. conic and pointed,  $\frac{1}{2}$  in. long, not fleshy, dark purple. Spain, Portugal, and Canary Isls.; cult. in many forms, and under various names as *P. azoricus*.

40. *P. Laurocerasus*, L. (*Laurocerasus officinalis*, Roem.). COMMON CHERRY-LAUREL. Evergreen bush, seldom a small tree, widely variable but known by its lvs. usually remotely small-toothed, racemes slender but not exceeding the lvs., calyx-lobes very short and 3-toothed: the lvs. in usual forms are oblong, 3-6 in. long, short-stalked, abruptly short-pointed, obtuse or sometimes even retuse: fr. conic and pointed, about  $\frac{1}{2}$  in. long, black-purple. S. E. Eu. to Persia.—In some of the cult. forms the lvs. are narrow and entire, in others short-oblong and blunt; the stature also is characteristic. The named cherry-laurels are mostly of this species, as *angustifolia*, *Bertinii*, *japonica*, *latifolia*, *parvifolia*, *rotundifolia*, *schipkaensis*, *versauillensis*, the names being used either as specific or varietal application.

41. *P. caroliniana*, Ait. (*Laurocerasus caroliniana*, Roem.). AMERICAN CHERRY-LAUREL. WILD-ORANGE and MOCK-ORANGE of the S. Evergreen tree 20-40 ft., often larger in cult.: lvs. oblong-lanceolate, acuminate, 2-4 in. long, narrowed to base, entire (only seldom with a few remote small teeth), margins slightly revolute, glossy: fls. very small, about  $\frac{1}{2}$  in. across, with brownish calyx and minute cream-white petals, in dense axillary racemes about 1 in. long; fr. short-ovoid, pointed,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, dry with thin outer shell, black and shining. Stream valleys S. C. to Tex., mostly not far from the coast; planted for shade, ornament, and hedges in the Old South and in S. Calif.

42. *P. ilicifolia*, Walp. ISLAY. Evergreen bush or tree, to 25 and 30 ft., glabrous, planted in Calif. for its holly-like foliage: lvs. ovate to ovate-lanceolate, about 1-2 in. long, very stiff and glossy, acute to obtuse or even emarginate, broad or rounded at base, the margins spiny-toothed: fls. small, white, about  $\frac{1}{2}$  in. across, in erect or ascending racemes 1-3 in. long: fr. nearly globular,  $\frac{1}{2}$ - $\frac{2}{3}$  in. diam., dark red to nearly black with thin austere flesh. Lower Calif., north to San Francisco.

43. *P. Lyoni*, Sarg. (*P. occidentalis*, Lyon, not Sw. *P. integrifolia*, Sarg.). ISLANDS CHERRY. Bushy tree on the islands of S. Calif., also in Lower Calif., often planted: lvs. longer, ovate to lanceolate, acute or acuminate, with entire margins except sometimes remotely denticulate on young shoots: fr. larger, with thick flesh. (Bears the name of Wm. S. Lyon, California botanist.)

23. COTONEASTER, Medic. Old World temp.-region woody plants, some of them grown for ornament; about 40 species.—Shrubs or seldom tree-like, evergreen or deciduous, not truly spiny, often with pubescent or tomentose parts: lvs. mostly small and numerous, alternate, short-petioled, simple and entire, stipulate: fls. white or pink, small but numerous, solitary, or in cymose clusters terminating lateral spurs, appearing in late spring and summer after the lvs. are out; calyx-tube and ovary joined; calyx-lobes 5, small, persistent on the fr.; petals 5; stamens about 20: fr. red or blackish, small, with 2-5 stones, mostly long-persistent and ornamental, appearing in summer and autumn and often attractive in winter. (Cotoneaster: Latin *quince*-like, from the lvs. of some species.)—The cotoneasters have come into use recently for the most part, and many of them are still under test.

- A. Petals pink or pinkish (nearly white in No. 2), small and upright; fr. red or black.  
 B. Fr. red.  
 C. Lvs. glabrous or only pubescent underneath (except sometimes on vigorous young shoots).  
 D. Plant prostrate or of low horizontal growth. . . . .<sup>#</sup> 1. *C. horizontalis*  
 DD. Plant erect or upright.  
 E. Length of lvs. 1 in. or less.  
 F. Young growth brown-tomentose: fls. nearly white. . . . . 2. *C. Simonsii*  
 FF. Young growth hairy or pubescent: fls. pink. . . . . 3. *C. divaricata*  
 EE. Length of lvs. 1½ in. or more. . . . . 4. *C. acuminata*  
 CC. Lvs. white- or grayish-tomentose underneath.  
 D. Fls. nodding, 2-4 together in the axils. . . . . 5. *C. integerrima*  
 DD. Fls. not nodding, on lateral spurs.  
 E. Usually 1-3 frs. together, hairy chiefly at apex. . . . . 6. *C. Dielsiana*  
 EE. Usually 5 or more frs., gray-hairy all over. . . . . 7. *C. Francheti*  
 BB. Fr. black or nearly so. . . . . 8. *C. foveolata*  
 AA. Petals white, spreading, rounded: fr. red.  
 B. Fls. 1-3: evergreen, prostrate or trailing.  
 C. Calyx almost glabrous; fr. tapering to stalk. . . . . 9. *C. rotundifolia*  
 CC. Calyx pubescent: fr. globular. . . . . 10. *C. microphylla*  
 BB. Fls. many, in clusters: half-evergreen or deciduous.  
 C. Lvs. broad-ovate to oval, 1½ in. or less long, deciduous. . . . . 11. *C. racemiflora*  
 CC. Lvs. elliptic to oblong, 1 in. or less long, half-evergreen. . . . . 12. *C. pannosa*  
 CCC. Lvs. oblong, 2-4 in. long, half-evergreen. . . . . 13. *C. frigida*

1. *C. horizontalis*, Decne. Deciduous or half-evergreen shrub of squat habit and horizontal pubescent branches, dense, reaching 2-3 ft. in height, the most popular of the cotoneasters: lvs. roundish to broad-oval, ½ in. or less long, cuspid-pointed, glabrous above and lightly hairy beneath: fls. 1-2, erect, pink, ¼ in. across, in spring: fr. globose or ovoid, about ½ in. diam., bright red, usually containing 3 stones. China.—*C. adpressa*, Bois (*C. horizontalis* var. *adpressa*, Schneid.), has oval undulate lvs. about ½ in. long, nearly glabrous, fr. larger and subglobose and usually bearing 2 stones. W. China; also in cult.

2. *C. Simonsii*, Baker. Deciduous or half-evergreen erect shrub with spreading branches, 4-8 ft. and more, with young growth woolly: lvs. roundish-oval, ¾-1 in. long, acute, glabrous above, somewhat hairy beneath: fls. 2-5, ½ in. across, white with pinkish tinge, on woolly pedicels: fr. ovoid-pyriform, about ½ in. long, bright red, bearing usually 3 or 4 stones. Himalayas; named for Mr. Simons, collector in Khasia Hills.

3. *C. divaricata*, Rehd. & Wils. Deciduous upright shrub to 6 ft., with spreading branches: lvs. round-oval to oval, ½-1 in. long, acute or nearly obtuse, tapering abruptly to base, shining above, lightly hairy beneath: fls. usually 3, pink, calyx pubescent: fr. ovoid, ½ in. long, bright red, with usually 2 stones. W. China.

4. *C. acuminata*, Lindl. Erect deciduous shrub to 10 ft., the young shoots woolly: lvs. oblong to ovate-lanceolate, mostly 1½-2 in. long, acute or acuminate, dark green and appressed-hairy above, paler and more hairy or pubescent beneath: fls. pinkish, about ⅔ in. across, in clusters of 2-5 on short leafy spurs: fr. oblong or turbinate, ½ in. long, scarlet, bearing 2 or 3 stones. Himalayas.

5. *C. integerrima*, Medic. (*C. vulgaris*, Lindl.). Erect deciduous shrub of bushy growth, 3-6 ft., with tomentose young growth: lvs. ovate to oval to almost orbicular, ¾-1½ in. long, mucronulate and acute or rounded at apex, glabrous or nearly so above, tomentose beneath: fls. 2-4 together in nodding clusters, about ¼ in. across, white with rose tint, the calyx glabrous outside: fr. globular, ¼ in. diam., red. Eu., Siberia.—*C. tomentosa*, Lindl., also Eurasian, has more numerous white fls. and calyx tomentose outside.

6. *C. Dielsiana*, Pritz. Deciduous shrub, 6-8 ft., with very slender and long arching or pendulous branches, the growing parts at first tomentose: lvs. ovate or elliptic, 1½ in. and less long, somewhat acute, the base rounded or broad-cuneate, veins prominent, at first hairy above, tomentose beneath: fls. about 3-5 on short lateral spurs, pinkish, ripening 1-3 globose or pyriform scarlet fr. about ¼ in. long. Cent. China; bears the name of Dr. L. Diels, German botanist, who has written on the flora of China.

7. *C. Francheti*, Bois. Evergreen shrub, 8-10 ft., with spreading arching branches, the young growth tomentose: lvs. oval, 1¼ in. or less long, acute or acuminate, narrowed at base, somewhat hairy above when young but becoming glossy, lower surface tomentose: fls. 5-15 in short close clusters, pinkish: fr. oblong or ovoid, about ½ in. long, red, bearing mostly 3 stones. W. China, Tibet; dedicated to Adrien Franchet, student of the plants of China and Japan.

8. *C. foveolata*, Rehd. & Wils. Deciduous shrub, 10–12 ft., branches spreading, young shoots hairy: lvs. elliptic to ovate, 2–4 in. long, acute or acuminate, dull green and soon glabrous above, pubescent beneath at least on the veins: fls. 3–7, rose-tinted, about  $\frac{1}{3}$  in. across: fr. nearly globular,  $\frac{1}{3}$  in. or less diam., becoming black, carrying 3 or 4 stones. China.

9. *C. rotundifolia*, Wall. Deciduous or half-evergreen shrub, low or prostrate, to 5–6 ft. or more high, with pubescent growths: lvs. broad-oval to nearly orbicular,  $\frac{1}{2}$  in. or less long, pubescent but becoming glabrous at least above: fls. 1–3 but mostly solitary, about  $\frac{1}{2}$  in. across, petals white but center pink: fr. nearly globose, about  $\frac{1}{2}$  in. long, red. Himalayas.—Var. *lanata*, Schneid. (*C. buxifolia*, Baker. *C. Wheeleri*, Hort.), has lvs. tomentose beneath and elliptic to elliptic-oblong.

10. *C. microphylla*, Wall. Spreading or prostrate evergreen, reaching 2–3 ft. in height, densely branched, young growths tomentose: lvs. ovate to obovate with cuneate base,  $\frac{1}{3}$  in. or less long, glossy above, tomentose beneath: fls. usually solitary,  $\frac{1}{2}$  in. across, white: fr. globular,  $\frac{1}{4}$  in. diam., red. High Himalayas.

11. *C. racemiflora*, Koch (*C. nummularia*, Fisch. & Mey.). Deciduous shrub, 4–6 ft., branches erect or widely spreading, young growth tomentose: lvs. nearly orbicular to broad-ovate,  $\frac{3}{4}$ –1  $\frac{1}{4}$  in. long, obtuse or acute, becoming glabrous above, tomentose beneath: fls. 4–12, about  $\frac{1}{4}$  in. across, white, pedicels pubescent, peduncle very short or not evident: fr. globular to ovoid,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, red. S. E. Eu., Asia.

12. *C. pannosa*, Franch. Evergreen or half-evergreen, 6–10 ft., with arching branches, growths tomentose when young: lvs. oval to ovate-oblong, 1 in. or less long, mucronate, dull green but glabrous above, densely grayish-tomentose beneath: fls. 15–20 in a cluster,  $\frac{3}{8}$  in. or less across, white: fr. ovoid or globose,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, red, with 2 stones. S. W. China.

13. *C. frigida*, Wall. Tall and large-leaved, deciduous or half-evergreen, reaching 25 ft. and more, branchlets pubescent becoming glabrous: lvs. long-oblong to -obovate, 2–4 in. or more long, acute both ways, dull green and glabrous above, tomentose beneath but becoming nearly glabrous: fls. many in long-stalked clusters to 2  $\frac{1}{2}$  in. diam., white,  $\frac{1}{2}$  in. across: fr. globular, size of small pea, red (a yellow var.). Himalayas.

24. **PYRACANTHA**, Roem. FIRETHORN. Less than a half-dozen known hardwooded evergreen shrubs of Eu. and Asia, closely allied to *Cotoneaster* and *Cratægus*: from the former distinguished by the presence of thorns, by serrate or crenate lvs. and very prominent stipules, fls. in corymbs, fr. with 5 stones; from *Cratægus* it is separated by bearing 2 fertile ovules (rather than 1) in each cell, as also by the leafy thorns, unlobed lvs. which are persistent. (*Pyracantha*: Greek *fire-thorn*, from the red frs.).

Main lvs. prevailing on the ovate order and acute.....1. *P. coccinea*

Main lvs. on the long-oblong order and obtuse.

Calyx and under side of lvs. glabrous.....2. *P. crenulata*

Calyx and under side of lvs. tomentose.....3. *P. angustifolia*

1. *P. coccinea*, Roem. (*Cotoneaster Pyracantha*, Spach. *Cratægus Pyracantha*, Borkh.). COMMON FIRETHORN. Shrub or tree-like, to 15 or 20 ft., the young parts grayish-pubescent, bearing many short sharp leafy spines: lvs. numerous, small, blades mostly not exceeding 2 in. long, oval to somewhat obovate, often oblong when clustered on spurs, the main lvs. acute, margins finely crenate-serrate, glabrous or pubescent only when young: fls. white,  $\frac{1}{2}$  in. across, numerous in late spring or early summer on short twigs of the season, the peduncle and pedicels usually pubescent: fr. globose, about  $\frac{1}{4}$  in. diam., pome-like with remains of calyx at top, bright red. S. Eu. and W. Asia, sometimes escaped in this country.—Used for hedges, and nearly evergreen as far north as N. Y. Var. *Lalandi*, Dipp., is more vigorous and erect, the fr. larger and orange-red; originated with M. Lalande, Angers, France; often confused with No. 2.

2. *P. crenulata*, Roem. (*Cotoneaster crenulata*, Wenz. *Cratægus crenulata*, Roxb.). Much like No. 1 but less hardy and of slower growth: lvs. prevailing narrower and obtuse, oblong to oblanceolate, stiff, more glossy: corymbs glabrous; fls. and frs. smaller, the latter orange-red or orange-yellow. Himalayas; little seen in cult.

3. *P. angustifolia*, Schneid. Stout more or less thorny shrub, with long often somewhat prostrate branches, the young growths tomentose: lvs. stiff, narrow-oblong, 1–2 in. long and about  $\frac{1}{4}$  in. broad, obtuse but usually apiculate in center, entire or obscurely denticulate at apex, revolute, glabrous above, grayish-tomentose



beneath, very short-stalked: infl. rather dense, short-peduncled, tomentose: fls. small, white, with densely tomentose calyx: fr. about  $\frac{1}{2}$  in. diam., yellow, becoming glabrous. S. W. China; grown in Calif. and to be expected in the S.

25. **OSTEOMELES**, Lindl. Three evergreen odd-pinnate-leaved shrubs of E. Asia and the Pacific Isls., planted in Calif. and far S.—Lvs. alternate, with many pairs of small entire lfts., with linear caducous stipules: fls. white, in cymose open clusters on leafy shoots of the season; calyx-lobes and petals 5; stamens 15–20; styles 5 and distinct; ovary in the calyx-tube and joined with it (inferior), 5-celled with single ovules: fr. small, pome-like, with calyx-lobes persistent on top and 5 stones. (Osteomeles: Greek *stone apple* or fruit.)

**O. anthyllidifolia**, Lindl. UHI-UHI of Hawaii. Shrub to 4–6 ft., densely silky-pubescent on shoots and foliage: lfts. 13–19, closely placed and sessile, oblong,  $\frac{1}{2}$  in. or less long, usually mucronate, becoming glabrous above: fls.  $\frac{1}{2}$  in. across, in pubescent clusters: fr. globose, about  $\frac{1}{2}$  in. diam., bluish-black, pubescent but becoming nearly glabrous. Hawaii south.—**O. Schwerinæ**, Schneid., from China, may be expected in collections; differs in more numerous smaller lfts. which are only slightly pubescent and glabrous fr.; named in compliment to Frau Gräfin v. Schwerin, wife of the president of the German Dendrological Society.

26. **CRATÆGUS**, L. HAWTHORN. Hardwooded thorny small trees and large shrubs sometimes planted for ornament and for hedges and one prized in the Orient for its edible frs. and somewhat introduced into N. Amer.; native in the north temp. zone, with the greatest extension in E. N. Amer.; about 1,000 species have been described, and any number are likely to be transferred to grounds, but very few are cult. plants.—Lvs. alternate, deciduous, simple, usually lobed and rarely pinnatifid, stipulate: fls. white to red, mostly in cymose corymbs, terminating short lateral leafy shoots,  $\frac{1}{3}$ – $\frac{3}{4}$  in. across; calyx-lobes and petals 5, inserted on a disk in the margin of the calyx-tube; stamens 5–25, in 1, 2, or 3 rows; carpels 1–5 in the calyx-tube and adnate to it, fertile ovule 1 in each cell: fr. a small pome with 1–5 bony 1-seeded stones, red, yellow, or nearly black. (Cratægus: Greek *strength*, from the strong wood.)—The plant grown as *C. coccinea* is probably not that species.

Lvs. not lobed.

Stamens 10: lvs. nearly or quite glabrous beneath.....1. *C. Crusgalli*

Stamens 20: lvs. hairy beneath.....2. *C. Carrerei*

Lvs. deeply lobed or pinnatifid.

Calyx-teeth deciduous from the fr., which is small and red.....3. *C. Phænopyrum*

Calyx-teeth persistent: fr. larger,  $\frac{1}{2}$  in. or more long.

Stones 1 or 2, with cavities or grooves on the inner faces.

Style 2: lobes of lvs. serrulate.....4. *C. Oxyacantha*

Style 1: lobes entire or nearly so.....5. *C. monogyna*

Stones 2–5, with plain or flat faces.

Branchlets and lvs. pubescent.....6. *C. Azarolus*

Branchlets and lvs. glabrous.....7. *C. pinnatifida*

1. **C. Crusgalli**, L. COCKSPUR THORN. Sometimes tree-like and 25 ft. tall, with glabrous branchlets; spines many, long and slender: lvs. obovate to oblanceolate, 1–3 in. long, commonly rounded at apex but at the same time perhaps with a little point, sharply irregularly serrate, glabrous, sometimes persisting into winter: fls. white,  $\frac{2}{3}$  in. across, in glabrous corymbs; calyx-lobes entire or only minutely serrate: fr. globose to ovoid,  $\frac{1}{2}$  in. long, dull red, often hanging all winter. Canada to N. C. and westward, in several forms.

2. **C. Carrerei**, Vauv. Stout tree to 20 ft., with pubescent shoots and few strong spines: lvs. oval to obovate, 2–4 in. long, acute, tapering to base, coarsely irregularly serrate, becoming glabrous and glossy above, pubescent beneath: fls. white with red disk, nearly 1 in. across, the pedicels and calyx pubescent; calyx-lobes linear and serrulate: fr. ovoid to pyriform,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., orange-red speckled brown, hanging in winter. Of garden origin, probably hybrid of *C. Crusgalli* and *C. mexicana*; bears the name of E. A. Carrière, French horticultural editor and author.

3. **C. Phænopyrum**, Medic. (*C. cordata*, Ait.). WASHINGTON THORN. Strong tree to 25 or 30 ft., with glabrous shoots and slender long spines: lvs. broad-ovate

to triangular,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, acute or acuminate, truncate to subcordate at base, 3–5-lobed, sharply or incisely serrate, becoming dark green and shining above, glabrous or nearly so beneath: fls. white, about  $\frac{1}{2}$  in. across, in glabrous corymbs; calyx-lobes glabrous, nearly triangular, entire: fr. nearly globose,  $\frac{1}{4}$  in. diam., shining scarlet, long-persisting. Va. to Ala. and west, naturalized northward and often cult. in the northern states; the name *Phenopyrum* refers to the shining fr. (Greek *phaino* to shine.)

4. *C. Oxyacantha*, L. ENGLISH HAWTHORN. Shapely thorny tree to 20 ft., with glabrous branchlets: lvs. roundish or broad-ovate in outline, 1–2 in. long, cuneate to nearly truncate at base, 3–5-lobed and the lobes usually serrate: fls. white,  $\frac{5}{8}$  in. diam., on slender glabrous pedicels, appearing when the lvs. are nearly full grown; calyx-lobes entire: fr. globular to oval,  $\frac{1}{2}$  in. or less long, scarlet (sometimes yellow), containing 2 stones with furrowed inner face. (*Oxyacantha* is a pre-Linnean name; Greek *sharp thorn*.) Eu., N. Afr.—Cult. in several forms and colors of fls.; double-fl. trees, with fls. whitish turning pink, are common in yards. Paul's hawthorn (var. *Paulii*, Rehd.) has double bright scarlet fls.

5. *C. monogyna*, Jacq. Apparently more common in cult. than No. 4 in single-fl. forms but not likely to be recognized in garden lists: a larger more thorny tree: lvs. larger and more deeply 3–5-lobed, the lobes entire or with few teeth at apex, style 1, fr. rounder with 1 stone. Eu. and N. Afr. to the Himalayas.—Cult. in many forms, as cut-leaved, weeping, twisted, yellow- and white-fruited, everblooming, variegated. Probably more frequently used for hedges than No. 4.

6. *C. Azarolus*, L. AZAROLE. Sparingly spiny tree to 30 ft., with pubescent branchlets: lvs. cuneate-obovate to rhomboidal in outline, 1–3 in. long, deeply 3–5-lobed, the lobes entire or toothed at apex, pubescent beneath but becoming glabrous above: fls. white, about  $\frac{1}{2}$  in. across, in tomentose dense small clusters: fr. large, sometimes  $\frac{3}{4}$  in. diam., globular or ovoid, orange-red to yellow but varying to red and whitish. (*Azarolus* is from an Arabic name of some kind of wild apple.) N. Afr. to Asia Minor; sometimes cult.

7. *C. pinnatifida*, Bunge. Small tree or shrub to 15 or 20 ft., with few and small thorns and glabrous growth: lvs. broad-ovate to elliptic-ovate in outline, 2–4 in. long, pinnately 3–9-parted, the lobes very sharp-serrate, glossy above, both surfaces with hairs along the veins: fls. white,  $\frac{3}{4}$  in. across, the pedicels glabrous or lightly pubescent: fr. globular or pyriform,  $\frac{1}{2}$  in. diam., red, punctate-dotted, the stones 3–5. Siberia, N. China, Korea.—Var. *major*, N. E. Br., has larger lvs. and pear-shaped fr.  $\frac{3}{4}$  in. diam. and 1 in. long, cult. in China for its edible fr.

27. *MESPILUS*, L. MESPIL. MEDLAR. One deciduous small tree, grown for its edible fr., native of Eu. and Asia Minor: distinguished from *Cratægus* and *Pyrus* in bearing large solitary fls. on leafy shoots of the season, in the large leafy calyx-lobes and specially in the open-topped fr., the 5 ovaries not being covered and the stones readily detached, the apex presenting a hairy disk or crater with the remains of the calyx-lobes about it. (*Mes-pilus*: old Greek name.)

*M. germanica*, L. (*Pyrus germanica*, Hook. f.). Crooked-growing tree or large shrub to 20 ft., often thorny, young growth hairy: lvs. simple, lance-oblong to oval-oblong, 3–5 in. long, very short-stalked, abruptly or somewhat gradually pointed, finely serrulate, pubescent, becoming nearly or quite glabrous above: fls. 1–2 in. across, white or bluish, appearing after the foliage: fr. apple-shaped, 1– $2\frac{1}{2}$  in. diam., without pedicel, eaten after frost and when incipient decay (bletting) has begun.

28. *CYDONIA*, Mill. QUINCE. One species, a familiar small fr.-bearing tree, native in Cent. and E. Asia, naturalized in the Medit. region.—Spineless: lvs. alternate, deciduous, simple and entire, stipulate: fls. large, white or light pink, solitary and terminating leafy shoots of the season; calyx-lobes 5, herbaceous; petals 5; stamens about 20; styles 5, free, indicating the 5 carpels: fr. a large 5-celled tomentose closed pome, with serrate calyx-lobes persistent on top at least for a time, seeds many in each cell. (*Cydo-nia*: old geographical name, Cydon in Crete.)

*C. oblonga*, Mill. (*C. vulgaris*, Pers. *Pyrus Cydonia*, L.). The common quince is a round-headed tree 15–20 ft. high with crooked branches and blackish bark: lvs.

broad-oval to oblong, 2-3½ in. long, blunt or very short-pointed, often subcordate, short-petioled, becoming glabrous above, tomentose beneath: fls. appearing with the main foliage, 2 2½ in. across: fr. globose to pyriform, fuzzy, 3-4 in. diam. in improved vars., without true st. or pedicel.

29 **CHÆNOMELES**, Lindl. Species probably not more than 3, usually thorny hardwooded shrubs, grown mostly for their brilliant very early fls.—Lvs deciduous or more or less persistent into winter, alternate, simple with serrate margins, stipules often very large: fls. solitary or in small clusters from lateral winter-buds, nearly or quite sessile, for the most part opening in advance of the foliage; calyx mostly colored, the lobes 5; petals 5; stamens many; styles 5, joined at base: fr. a small or large pome with closed top, with 5 many-seeded cells, the calyx-lobes not persistent, pedicel or st. lacking. (Chænomeles: Greek compound, of no special application.)

Fls. in clusters; calyx colored, the lobes erect; stipules large, conspicuous and persistent on young shoots.

Lvs. mainly oblong-ovate or narrower, acute.....1. *C. lagenaria*

Lvs. broad-oval to nearly orbicular, rounded at apex.....2. *C. japonica*

Fls. solitary; calyx not colored, the lobes reflexed and tomentose inside: stipules small.....3. *C. sinensis*

1. *C. lagenaria*, Koidz. (*C. japonica*, Hort., not Lindl. *Cydonia japonica* and *Pyrus japonica*, Hort.). JAPANESE QUINCE. Stiff-branched thorny shrub with glabrous or rarely slightly pubescent young growth, making a thick top, sometimes 10 ft. high: lvs. oblong-ovate to lanceolate, 1½-3 in. long, acute or acuminate, finely sharp-serrate, glabrous, shining above: fls. 2-6, to 2 in. across, scarlet-red, the petals of a waxy consistency, appearing in advance of lvs.: fr. globular to oblong, very hard, 1½-2 in. long, greenish-yellow with small dots, with cavity at either end, core very large. China, Japan.—Cult. in many forms and kinds, often under the name "Japonica," as white-fl., rose, striped, double; sometimes planted for garden hedges; fr. sometimes mentioned for jellies and preserving. Var. *cathayensis*, Rehd. (*C. cathayensis*, Schneid.), has narrow lanceolate lvs. pubescent beneath when young.

2. *C. japonica*, Lindl. (*C. Maulei*, Schneid. *Cydonia Maulei*, Moore. *Pyrus japonica*, Thunb.). DWARF JAPANESE QUINCE. Dwarf, 3 ft. or less high, with warty pubescent young growth: lvs. nearly orbicular, roundish-oval to obovate, 1-2 in. long, obtuse or sometimes very short-acute, coarsely toothed: fls. to 1½ in. across, orange-scarlet: fr. nearly globular, 1½ in. diam., yellow with red blush. Japan.—Var. *alpina*, Schneid. (*C. Sargentii*, Lem.), is very spiny, with procumbent sts. and ascending branches: lvs. small, ½-1 in. long, roundish-oval. Japan. *C. superba*, Rehd. (*C. japonica* × *C. lagenaria*), has narrower, acute, more sharply serrate lvs. and larger blood-red fls. There was early misapplication of the names in Nos. 1 and 2, leading to confusion: *C. japonica*, long applied to No. 1, belongs properly with No. 2 and *C. Maulei* becomes a synonym of it; while No. 1 must take another name, *C. lagenaria*.

3. *C. sinensis*, Koehne (*Cydonia sinensis*, Thouin. *Pseudocydonia sinensis*, Schneid.). CHINESE QUINCE. Small spineless tree, 10-20 ft., with half-evergreen foliage S. and hairy young growth: lvs. elliptic-ovate to somewhat obovate, 2-3½ in. long, very abruptly short-pointed, sharply callous-serrate, the short petiole with gland-tipped teeth, glabrous above, hairy beneath but becoming nearly glabrous: fls. solitary, 1-1½ in. across, light pink, in advance of the foliage: fr. large, 4-7 in. long, oblong, yellow, with naked cavities at either end, gritty, the cells 2 in. or more long. China; not often hardy north of Philadelphia; sometimes recommended for its fr. for culinary purposes.

30. **RAPHIOLEPIS**, Lindl. Probably less than a half-dozen species in Japan and China, evergreen shrubs grown for ornament in the S. and sometimes under glass.—Thornless: lvs. alternate, thick and glossy, short-petioled, serrate or entire: fls. white or pinkish, of medium size, on thickened articulated pedicels in close racemes or panicles from scaly terminal buds; calyx-lobes 5, erect or reflexed, not persistent; petals 5, broad; stamens 15-20; carpels (and styles) 2 or 3, joined at the base, inferior: fr. a drupe-like little pome, purplish- or bluish-black, with 1 or 2 seeds. (Raphiol-epis: Greek needle scale, referring to the bracts in the infl.)

Lvs. manifestly toothed, pointed, not thick and heavy: fls. tinged pink. . . . 1. *R. indica*  
 Lvs. obscurely and remotely crenate, or entire, mostly obtuse, leathery:

fls. white. . . . . 2. *R. umbellata*

1. *R. indica*, Lindl. (*R. salicifolia*, Lindl.). INDIAN-HAWTHORN. Variable, in several lf.-forms, a shrub 4-5 ft. high: lvs. oblong-lanceolate to obovate-lanceolate, 2-3 in. long, pointed or acuminate, bluntly toothed, not very thick or heavy or revolute, glabrous or at first somewhat pubescent: fls. about  $\frac{1}{2}$  in. across, white tinged pink, in relatively loose mostly glabrous panicles; calyx-lobes usually red, lanceolate. S. China.

2. *R. umbellata*, Schneid. (*R. japonica*, Sieb. & Zucc. *R. ovata*, Briot). Strong shrub to 10-12 ft.: lvs. very thick and leathery, 1-3 in. long, obovate or oval, mostly rounded at apex, margin revolute, remotely crenate-serrate or (in. var. *integerrima*, Rehd.) entire, glossy, tomentose when young: fls.  $\frac{3}{4}$  in. across, white and fragrant, in dense pubescent dry-bracted racemes or panicles; calyx-lobes triangular-pointed, not red: fr.  $\frac{1}{2}$ - $\frac{1}{2}$  in. diam. Japan.—*R. Delacourii*, André, is a pink-fl'd. var. with serrate lvs., supposed to be a hybrid between Nos. 1 and 2.

31. AMELANCHIER, Medic. SERVICE-BERRY. JUNE-BERRY. Shrubs and small trees sometimes planted for the showy early white fls. and also for the edible frs.; species probably 25, in the north temp. zone, mostly in N. Amer.—Unarmed, deciduous: lvs. alternate, simple, on the ovate and oval order, serrate, petiolate: fls. racemose (seldom solitary or 2-3 together), appearing in advance of the foliage or with it; calyx 5-cleft, the tube campanulate, the lobes persistent on the fr.; petals 5, narrow; stamens 10-20, short; ovary inferior, adnate in the calyx-tube or hypanthium, the styles and carpels 2-5, the cells 2-ovuled: fr. a fleshy little pome, dark blue or black, usually becoming 10-celled by the growth of 5 false partitions, each cell therefore 1-seeded when the ovules all mature. (Amelan-chier: name of doubtful origin, probably from a vernacular.)—Any one of the native Amelanchiers may appear in plantings, but only the name *A. canadensis* is common; the European species, *A. rotundifolia*, is to be expected; and the dwarf Juneberry, grown for its edible fr., is to be accounted for, although the botany of these plants requires further study.

Styles very short, not exceeding the calyx-tube and much shorter than the stamens, distinct. . . . . 1. *A. rotundifolia*

Styles prominent, about as long as the stamens, more or less joined at the base.

Summit of the ovary woolly; calyx-tube prominent on the young fr., sepals recurved: plants dwarf, 3-7 ft. high. . . . . 2. *A. alnifolia*

Summit of the ovary glabrous or nearly so; calyx-tube not prominent, sepals erect, spreading, or reflexed: plants normally taller.

Lvs. densely white-woolly when young, becoming green.

Sepals lance-deltoid, erect or spreading; petals  $\frac{1}{4}$ - $\frac{1}{2}$  in. long;

lvs. oblong, obtuse or acute: tall shrubs in clumps. . . . . 3. *A. oblongifolia*

Sepals ovate reflexed; petals  $\frac{3}{8}$ - $\frac{1}{2}$  in. long: lvs. chiefly obovate,

acuminate: becoming small trees. . . . . 4. *A. canadensis*

Lvs. glabrous or nearly so from the first, often bronzy. . . . . 5. *A. laevis*

1. *A. rotundifolia*, Dum.-Cours. (*A. vulgaris*, Moench). SERVICE-BERRY. Either a shrub or a small tree to 20 ft., the young parts pubescent or tomentose: lvs. oval, broad-oval to obovate, 1-2 in. long, mostly obtuse, rounded or subcordate at base, sharp-toothed from near the base, tomentose beneath when young but becoming glabrous: fls. white, 1-1 $\frac{1}{2}$  in. across, in erect racemes; petals obtuse or emarginate; styles very short: fr. size of black currant, glaucous-black, not palatable. Cent. and S. Eu.

2. *A. alnifolia*, Nutt. Low dwarf stoloniferous plants with oblong or oval blunt lvs., small fls., short correspondingly broad petals, and juicy dark purple fr. are in cult. under this name and the English name Dwarf Juneberry. The origin and identity of these forms have not been established. They may represent more than one species.

3. *A. oblongifolia*, Roemer. Shrub 6-20 ft. high, growing in clumps; lvs. oblong, elliptic-oblong or narrowly obovate-oblong, generally rounded at base and rounded or acute at apex, white-tomentose beneath when young, later glabrate, finely serrate; fls. appearing with the lvs.; sepals erect or irregularly spreading; petals rather small, narrow: fr.  $\frac{1}{2}$  in. diam., sweet and juicy, dark-purple. Swamps Me.,



S. C. along the coast.—Much planted in parks in the E. for the early white effect of fls. and foliage.

4. *A. canadensis*, Medic. (*A. Botryapium*, Borkh.). Small irregular tree, or often shrub-like, 15–30 ft. high: lvs. generally obovate, rarely ovate, oval or oblong, subcordate, more acuminate than in other species, sharply serrate with broad-bodied teeth, densely white-tomentose when young, somewhat hairy beneath and on the petioles at maturity: fls. appearing before or with the lvs.; calyx-tube especially small,  $\frac{1}{10}$ – $\frac{1}{8}$  in. broad, sepals broadly ovate, reflexed; fr. about  $\frac{1}{4}$  in. diam., maroon-purple, dry, tasteless, falling early. W. New England to Kans., Ga., and La.—Infrequently planted. The white young foliage increases the pure white effect.

5. *A. lævis*, Wiegand. When full grown a tree 40 ft. high: lvs. ovate, oval or ovate-oblong or slightly obovate, generally rounded at base, short-acuminate at apex, serrate with subulate teeth, glabrous from the first or very nearly so: fls. appearing with the lvs.; sepals reflexed, lance-triangular: fr.  $\frac{1}{3}$  in. diam., sweet and juicy, dark purple. Newf. to Mich. and Ga.—Very ornamental because of contrast between large drooping or spreading lacy fls. and the purplish bronzy or bright green foliage. Infrequently planted. The native *A. sanguinea*, Pursh, *A. stolonifera*, Wiegand and *A. humilis*, Wiegand may be occasionally found in local cult.

32. **ERIOBOTRYA**, Lindl. Evergreen shrubs and small trees, about 10 species in farther Asia, one grown for ornament and for its edible frs.—Lvs. large, alternate, short-petiolate or nearly sessile, simple, strongly pinnate-veined: fls. white or whitish, in terminal panicles; calyx-lobes 5, persistent on top of fr.; petals 5, broad, clawed; stamens about 20; ovary inferior, of 2–5 cells or carpels and an equal number of styles (usually 5), ovules 2 in each cell: fr. a pome with 1 or 2 or few large seeds. (Eriobotrya: Greek *woolly cluster* from the tomentose infl.)

*E. japonica*, Lindl. (*Photinia japonica*, Gray). LOQUAT. Small round-headed tree 20 ft. or more high, with rusty-tomentose branchlets: lvs. stiff and persistent, from lance-oblong to oval-oblong and obovate, 6–12 in. long, acute or acuminate, the side nerves running to sharp teeth, glossy above but rusty-tomentose beneath: fls. white,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, in dry-bracted rusty terminal panicles late in the year: fr. ripening following spring, pyriform,  $1\frac{1}{2}$  in. long, yellow, with a few large seeds, agreeably acid. Japan and China; planted far S., sometimes under the name “Japan plum”; there is a var. with variegated foliage.

33. **PHOTINIA**, Lindl. Small trees and shrubs sometimes planted for ornament, about 30 species native mostly in farther Asia.—Deciduous or evergreen, thornless: lvs. alternate, short-petiolate, usually serrate, stipulate: fls. mostly white, rather small, in corymbs or close short terminal panicles; calyx with mostly campanulate tube, the lobes 5 and persistent on the fr.; petals 5, broad; stamens about 20; styles usually 2, connate at base: fr. a small berry-like 1-seeded pome hollow at the top. (Photinia: Greek *shining*, from the lvs.)

Lvs. evergreen: fls. in large compound clusters . . . . . 1. *P. serrulata*  
Lvs. deciduous: fl.-clusters simple or nearly so . . . . . 2. *P. villosa*

1. *P. serrulata*, Lindl. Shrub or small tree to 30 ft. or more, with glabrous young growth: lvs. stiff, oblong to oblong-obovate, 4–8 in. long, abruptly pointed or sometimes acuminate, evenly serrulate, glossy above, glabrous, petioles 1 in. or less long: fls. many, white,  $\frac{1}{4}$ – $\frac{3}{8}$  in. across, in flattish terminal corymbose panicles 4–6 in. across, in late spring and summer: fr. globose, about  $\frac{1}{4}$  in. across, red. China, where it is also much planted; cult. in this country in the southern parts and in Calif.

2. *P. villosa*, DC. (*P. arguta*, Hort.). Deciduous shrub, or sometimes tree-like to 15 ft., the young parts lightly hairy: lvs. oval to lance-ovate,  $1\frac{1}{2}$ –3 in. long, acuminate, narrowed into very short petiole, very sharp-serrate, glabrous above, more or less hairy beneath at least on veins: fls. white, about  $\frac{1}{2}$  in. across, in corymbs 1–2 in. across borne on short lateral branches, appearing with the foliage: fr. oblong to nearly pyriform, about  $\frac{1}{3}$  in. long, scarlet, on warted pedicels. China, Japan; hardy N.

34. **HETEROMELES**, Roem. One evergreen shrub distinguished from Photinia by the 10 rather than 20 stamens in pairs opposite the calyx-teeth;

filaments broadened at base and somewhat united; carpels 2 or 3, the styles distinct: fr. with persistent calyx-teeth inflexed over the carpels. (Heteromeles: Greek *different apple*; i. e., unlike related genera.)

**H. arbutifolia**, Roem. (*Photinia arbutifolia*, Lindl.). TOLLON or TOYON. CHRISTMAS BERRY. Shrub or tree-like to 15 ft., with glabrous or lightly pubescent young growth: lvs. thick, oblong to oblong-lanceolate, 2-4 in. long, acute or abruptly very short-pointed, short-petioled, sharp-serrate, shining above, glabrous: fls. white, about  $\frac{1}{4}$  in. across, in rather close panicles 2-3 in. high that spread in fr., in spring and summer: fr. oblong to ovoid,  $\frac{1}{4}$   $\frac{1}{2}$  in. long, bright red (varying to yellow), ripening late in season and persisting. Calif. and Lower Calif., and much planted.

**35. STRANVÆSIA**, Lindl. Three or 4 evergreen shrubs and trees in farther Asia, one or two sometimes planted in the middle country and S.—Thornless: lvs. alternate, entire or serrate, glandless, stipulate: fls. white, in terminal clusters; calyx-teeth 5, persistent and incurved in fr.; petals 5, usually broad and clawed; stamens about 20; carpels 5, the 5 styles joined half or more their length, cells 2-ovuled: fr. a little pome, usually 5-seeded. (Stranvæ-sia: bears the name of Wm. T. H. Fox-Strangways, 1795-1865, English botanist.)

**S. Davidiana**, Decne. Spreading shrub or small tree to 20 ft. or more, the young parts hairy-pubescent: lvs. coriaceous, oblong to oval-lanceolate, 2-4 in. long, acute or acuminate, petiolate, entire, glabrous above and usually becoming so beneath: fls.  $\frac{1}{2}$  in. across, in corymbs 3-4 in. across: fr. nearly globular,  $\frac{1}{2}$  in. or less diam., scarlet. (Abbé David, page 327.) China.—Var. **undulata**, Rehd. & Wils. (*S. undulata*, Decne.), has undulate lvs. and smaller nearly glabrous corymbs. China.

**36. SORBUS**, L. MOUNTAIN-ASH. If held to include *Cormus*, *Micromeles*, and *Torminaria*, there are 80-100 species in the north temp. zone, several of which are grown for ornament.—Deciduous small trees, or sometimes tall shrubs, with large winter-buds: lvs. simple or odd-pinnate, alternate, margins sharply and sometimes doubly serrate, stipulate: fls. white, mostly many and showy, in terminal branching more or less leafy cymose clusters; calyx-lobes 5, usually persistent on the fr.; petals 5, broad, narrowed or clawed; stamens 15-20; carpels 2-5, inferior or partly superior, the styles free or connate at base: fr. a 2-5-celled small berry-like pome, 10-seeded or 5-seeded by abortion. (Sorb-us: ancient Latin name.)—The genus yields a number of marked and interesting hybrids.

Lvs. truly odd-pinnate.

Fls. in flattish clusters: fr. berry-like,  $\frac{1}{2}$  in. or less diam.

Lfts. blunt or very short-pointed, pubescent beneath. .... 1. *S. Aucuparia*

Lfts. acuminate and taper-pointed, glabrous beneath. .... 2. *S. americana*

Fls. in pyramidal pointed clusters: frs. mostly  $\frac{3}{4}$  in. or more diam. .... 3. *S. domestica*

Lvs. pinnate-like, sometimes only pinnatifid, sometimes on the same tree

with a few separate lft.-like lobes: hybrid. .... 4. *S. hybrida*

Lvs. simple, sometimes lobed but not pinnately.

Foliage white-tomentose beneath, not lobed. .... 5. *S. Aria*

Foliage green beneath or becoming so, strongly lobed. .... 6. *S. torminalis*

**1. S. Aucuparia**, L. (*Pyrus Aucuparia*, Ehrh.). EUROPEAN MOUNTAIN-ASH. ROWAN. Attractive round-headed tree to 50 ft., with pubescent young growth, and pubescent but not sticky terminal buds, bark close and smooth: lvs. oblong in outline, 5-9 in. long; lfts. 9-15, oblong-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, short-pointed or blunt, sharp-serrate from near the base, mostly remaining pubescent beneath, sessile: fls. about  $\frac{1}{2}$  in. across, in flat or somewhat rounded compound cymes 4-6 in. across: fr. globular,  $\frac{1}{2}$  in. or less diam., bright red, persisting and ornamental. (Aucuparia refers to the use of the fr. in catching birds: Latin *aucupatio*, fowling or bird-catching.) Eu. and Asia; now widely spread in cult. and sometimes spontaneous.—There are many forms, as weeping, fastigiate, cut-leaved, yellow-leaved, entire-leafleted, yellow-fruited.

**2. S. americana**, Marsh. (*Pyrus americana*, DC.). A smaller tree than No. 1, young growths glabrous or soon becoming so and terminal buds glutinous: lfts.

11-17, long-pointed and glabrous beneath: fls. and frs. smaller. Newf. to mts. of Tenn. and northwestward; frequently planted.

3. *S. domestica*, L. (*Pyrus Sorbus*, Gaertn. *P. domestica*, Sm.). SERVICE-TREE. Much like No. 1 but winter-buds glutinous, bark scaling, fls. 11-21, fls. about  $\frac{1}{2}$  in. across, in a more or less pyramidal cluster, fr. apple-shaped or pear-shaped,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long. S. and E. Eu., N. Afr., and W. Asia; sometimes seen about premises.

4. *S. hybrida*, L. (*Pyrus pinnatifida*, Ehrh.). Considered to be a natural hybrid between *S. intermedia* and *S. Aucuparia*: tree to 40-50 ft., young shoots floccose, winter-buds pubescent and not glutinous: lvs. oblong to oblong-ovate, 3-5 in. long, various, deeply scalloped or shallowly obtuse-lobed along the sides, or sometimes pinnatifid throughout, sometimes with separate narrow lfts. at the base, all the lobes toothed at apex, becoming glabrous above, tomentose or pubescent beneath: fls.  $\frac{1}{2}$  in. across, in pubescent clusters about 3 in. broad: frs. ovoid, about  $\frac{1}{2}$  in. long, bright red. Of European origin; frequent along streets and by premises.

5. *S. Aria*, Crantz (*Pyrus Aria*, Ehrh.). WHITEBEAM. Stout tree to 50 ft. and more, remaining a shrub on poor lands, with pubescent young parts and pubescent not glutinous buds: lvs. elliptic to oval or obovate, 2-5 in. long, rather thick, rounded or short-acute, not lobed, the margin double-toothed, the straight side veins prominent, dark green above but white-tomentose beneath: fls. dull white, about  $\frac{1}{2}$  in. across, with heavy scent, in tomentose clusters 2-3 in. broad: fr. nearly globular,  $\frac{1}{2}$  in. or less diam., scarlet and speckled. (Aria is an old Greek name for the tree.) Eu., Asia.—Known in cult. in several forms, as large-leaved (var. *Decaisneana*, Rehd., or *majestica*), narrow-leaved, yellow-leaved. *S. intermedia*, Pers., related by the lvs. shallowly lobed at middle and toward base, and gray-tomentose beneath. Eu.; a supposed parent of No. 4.

6. *S. torminalis*, Crantz (*Pyrus torminalis*, Ehrh.). WILD SERVICE-TREE. Stout tree to 40-50 ft. or more, young parts floccose, winter-buds small and shining but not glutinous: lvs. broad-ovate to somewhat triangular, 2-5 in. long, with 2-4 angular pointed serrate lobes on either side, sinuses extending one-third to one-half the way to the midrib, usually becoming glabrous on both surfaces, shining above: fls. about  $\frac{1}{2}$  in. across, in terminal tomentose clusters 3-4 in. broad: fr. nearly globular, or oval,  $\frac{3}{4}$  in. or less long, brown and dotted. (The name *torminalis* refers to *colic* or *gripes*.) S. and Cent. Eu.

37. ARONIA, Medic. CHokeberry. Three little shrubs of swamps and low woods in E. N. Amer., planted for ornament.—Deciduous, thornless: lvs. alternate, simple, petiolate, serrate, glandular on the midrib above, stipules small and caducous: fls. white or sometimes tinted, in small compound terminal cymes appearing with the early lvs.; calyx urn-shaped with 5 lobes persistent on the top of fr.; petals 5, spreading; stamens many; carpels usually 5, the 5 styles joined at the base: fr. a little berry-like pome, with as many cells as styles, red, purplish, or black. (Aro-nia: modified from Aria,—*Sorbus Aria*.)—Doubtfully a distinct genus.

Lower surface of lvs. and cyme tomentose or pubescent.

Calyx-lobes prominently glandular: fr. bright red. .... 1. *A. arbutifolia*

Calyx-lobes little or not at all glandular: fr. purplish. .... 2. *A. floribunda*

Lower surface and cyme nearly or quite glabrous. .... 3. *A. melanocarpa*

1. *A. arbutifolia*, Ell. (*Pyrus arbutifolia*, L. f.). RED CHokeberry. Branching erect shrub as high as a man but sometimes 10-12 ft.: lvs. obovate, oblong to oval, 1-3 in. long, abruptly short-pointed, narrowed to short petiole, sharply serrate, grayish-pubescent or -tomentose beneath: fls. white, often tinged red,  $\frac{1}{3}$ - $\frac{1}{2}$  in. across, in pubescent cymes terminating lateral branchlets; calyx-lobes with many glands: fr. oblong or somewhat pear-shaped,  $\frac{1}{4}$  in. or less diam., bright red, long persistent. Mass. to Fla. and west.

2. *A. floribunda*, Spach (*Pyrus floribunda*, Lindl. *Aronia atropurpurea*, Britt. *Pyrus arbutifolia* var. *arbutifolia*, Rob. *P. atropurpurea*, Bailey). PURPLE CHokeberry. Of similar range but extending to Newf.: calyx-lobes little or not at all glandular, fr. larger, about  $\frac{1}{2}$  in. diam., nearly globular, purple-black, long persistent.

3. *A. melanocarpa*, Spach (*A. nigra*, Koelne. *Pyrus nigra*, Sarg. *Pyrus melanocarpa*, Willd.). BLACK CHokeberry. Lvs. nearly or quite glabrous beneath, pedicels and calyx essentially glabrous, calyx-lobes somewhat glandular, fr. globose, about  $\frac{1}{2}$  in. diam., black, usually not long persisting. Similar range to No. 2.

38. **PYRUS, L. PEAR and APPLE.** As here considered, including *Malus* but excluding *Sorbus* and others, the genus probably has 60 species, in the north temp. zone, some of which are extensively grown in orchards for fr. and many others for ornament.—Deciduous or nearly deciduous trees or sometimes big shrubs, without true spines but the spurs becoming more or less thorn-like in run-wild forms: lvs. alternate, simple but sometimes deeply lobed, serrate or dentate, with small caducous stipules: fls. normally bisexual, regular, in simple umbel-like clusters from winter-buds either in advance of foliage or with it; calyx-tube or hypanthium urn-shaped, in which the 2-5 carpels are imbedded; calyx-lobes 5, persisting on the top of the fr. but in some cases falling before maturity; petals 5, obovate, showy, inserted on rim of calyx-tube; stamens 15-20 or more; styles as many as the carpels or cells, either free or united at base; cells 2-ovuled: fr. a true pome, fleshy, including 5 cartilaginous cells, each cell normally 2-seeded, with a true "stem" or pedicel. (*Py-rus*: classical name of the pear-tree.)—Species of oriental pears have been introduced recently as stocks for experimental purposes, but they need not be entered here. Several apples (*Malus*) are native in N. Amer., but no pears.

1. The Pears: calyx-tube or hypanthium closed in fl. by a cushion-like formation: fls. commonly white; styles usually free to base: fr. often without cavity at st.-end, bearing prominent grit-cells.—**PYROPHORA.**
  - A. Lvs. short-pointed, the serratures obtuse (crenate): calyx persisting on fr.
    - B. Shoots glabrous or soon becoming so. .... 1. *P. communis*
    - BB. Shoots white- or grayish-pubescent. .... 2. *P. nivalis*
  - AA. Lvs. acuminate, setose-serrate: calyx falling before fr. matures. .... 3. *P. serotina*
2. The Apples: calyx-tube open in anthesis: fls. white, pink, or light red; styles more or less united toward base: fr. with cavity or depression on both ends, free from grit-cells.—**MALUS.**
  - A. Calyx-lobes persisting on the ripe fr., forming the "calyx" of pomological descriptions, sitting in the "basin" or apical depression. (Hybrid under No. 16 may be sought here.)
    - B. Under side of lvs. soft-pubescent or tomentose when mature.
      - C. Lobes of calyx reflexed in anthesis: pedicel short, mostly under 1 in. (often only  $\frac{1}{2}$ - $\frac{3}{4}$  in.): lvs. closely crenate-serrate. .... 4. *P. Malus*
      - CC. Lobes of calyx erect or spreading: pedicels often or mostly more than 1 in. long: lvs. notched or strongly toothed with intermediate serratures. .... 5. *P. ioensis*
      - CCC. Lobes erect-spreading or sometimes more or less reflexed: pedicels as in No. 4: lvs. nearly as in No. 5: hybrid. .... 6. *P. Soulardi*
    - BB. Under side of lvs. fully or nearly glabrous, at least not soft-pubescent or tomentose; lf. hard in texture.
      - C. Lvs. neither lobed nor rounded at apex.
        - D. Lobes of calyx shorter or at least not longer than the tube: lvs. shining above. .... 7. *P. spectabilis*
        - DD. Lobes of calyx acuminate and exceeding tube: lvs. dull above. .... 8. *P. prunifolia*
      - CC. Lvs. narrow, usually rounded at apex, partially evergreen, not lobed or only obscurely so on tips of vigorous shoots. .... 9. *P. angustifolia*
      - CCC. Lvs. broad, on vigorous shoots prominently lobed. .... 10. *P. coronaria*
  - AA. Lvs. lobes falling from the grown or mature fr. (exceptions in certain hybrids and in forms of No. 13).
    - B. Lvs. on young shoots always unlobed: vernation convolute (lvs. rolled up, seen as they expand).
      - C. Lobes of calyx triangular-ovate, obtusish, shorter or at least not longer than the tube: margins of lvs. very closely serrate or even entire: parts purplish. .... 11. *P. Halliana*
      - CC. Lobes of calyx narrow-lanceolate, longer than the tube: margins of lvs. incurved- or callus-serrate. .... 12. *P. baccata*
    - BB. Lvs. on young shoots not lobed and seldom lightly notched: vernation conduplicate (lvs. folded together lengthwise face to face): margins of lvs. often sharp-serrate.
      - C. Fls. rose-red. .... 13. *P. pulcherrima*
      - CC. Fls. white or pinkish. .... 14. *P. Zumi*
    - BBB. Lvs. on young vigorous shoots lobed or strongly notched: vernation conduplicate (except in No. 17).
      - C. Styles villous at base (see note under No. 15): fr. essentially globular.
        - D. Fls. white; petals clawed. .... 15. *P. Sargentii*
        - DD. Fls. pink or red; petals cuneate at base. .... 16. *P. Sieboldi*
      - CC. Styles glabrous: fr. oblong. .... 17. *P. fusca*



1. *P. communis*, L. PEAR. Large tree, attaining great age, in its wild and semi-wild state producing thorn-like leafy spurs, the young growth becoming glabrous: lvs. oval to oblong-ovate, 2-4 in. long, hard in texture, drying black, with prominent short point, serratures fine, crenate or appressed, or sometimes practically wanting, soon becoming glabrous: fls. white or rarely tinged pink, 1 in. or more across, 4-12 together on slender pedicels, appearing with the first foliage: fr. variable, mostly pyriform with tapering base but sometimes apple-shaped, calyx-lobes persisting, the flesh with gritty concretions unless ripened after removal from the tree. S. E. Eu. and S. W. Asia; cult. in many named pomological vars.; there are also ornamental forms, as cut-leaved, lobed-leaved, variegated.

2. *P. nivalis*, Jacq. SNOW PEAR. Small tree with white-tomentose growth: lvs. oval to obovate, 2-3 in. long, white-tomentose on both sides at first and more or less remaining so beneath: fls. clear white, about  $1\frac{1}{2}$  in. across: fr. globose, 1-2 in. diam. E. Eu. and Asia Minor; cult. somewhat in Eu. for its white foliage, also sometimes for its frs. which are blotted or used for the making of perry; probably not planted in this country outside experiment grounds and botanic gardens.

3. *P. serotina*, Rehd., var. *culta*, Rehd. (*P. sinensis*, Hort., not Lindl.). JAPANESE and CHINESE PEAR. SAND PEAR. Tree to 30-50 ft., young growth glabrous or soon becoming so: lvs. ovate, sometimes ovate-oblong, 4-6 in. long and 3-4 in. broad, long and narrowly acuminate, conspicuously setose-serrate, glabrous or becoming so, glossy green: fls. white,  $1\frac{1}{2}$  in. across, about 6-9 to an umbel, with the foliage or just in advance of it: fr. very hard and usually rough, long-keeping, mostly apple-shaped with depression at st.-end, calyx-lobes falling before maturity, flesh very gritty.—The native form, *P. serotina*, differing in its smaller lvs. and frs., is native in Cent. and W. China; var. *culta* is grown in this country to some extent for fr., and this or related species for stocks; LeConte, Kieffer, and others are hybrids with *P. communis*.

4. *P. Malus*, L. (*Malus sylvestris*, Mill. *M. communis*, DC.). APPLE. Familiar round-headed tree with tomentose or heavily pubescent young growth: lvs. oval, ovate, oblong-ovate to broad-ovate, 2-4 in. long, thick and veiny, mostly abruptly short-pointed, broad at base, unequally mostly rather bluntly serrate, becoming glabrous and more or less glossy above, pubescent beneath: fls. white, light pink, or rose,  $1\frac{1}{2}$ -2 in. across, appearing with the foliage or just in advance of it, on tomentose pedicels: fr. various in size, shape, color, and season, globular, oblate, conic, with depression at either end, calyx-lobes persisting, flesh without grit-cells. (*Malus* is the classical name for the apple-tree.) Probably original in Eu. and W. temp. Asia, now run wild in many places.—In its native or naturalized state, the small acerb frs. are known as crabs, although the term crab-apple is more definitely applied to *P. baccata* (No. 12). Var. *paradisiaca*, L. (*Malus pumila*, Mill.), is the Paradise apple, a race of very small stature. Var. *apetala*, Aschers. & Graebn., is the so-called Bloomless apple: fls. without good stamens and colored petals; styles 10-15 and ovary 6-7-celled or more; calyx end of fr. not closed: an occasional monstrous state, the fr. probably produced by pollination from other apples. *P. Dawsoniana* may be sought here: see under No. 17.

Var. *Niedwetzkyana*, Aschers. & Graebn. (*P. Niedwetzkyana*, Hemsl.) RED-VEIN CRAB. Lvs. tinged red on rib and nerves, fls. deep red-purple, fr. purplish inside and out. S. W. Siberia (first collected by Niedwetzky) and Caucasus.

5. *P. ioensis*, Bailey (*Malus ioensis*, Britt.). PRAIRIE CRAB. Tree to 20-30 ft., with young parts gray-tomentose: lvs. ovate-oblong to nearly ovate or somewhat obovate, 2-3½ in. long, obtuse or short-acute at apex, irregularly and mostly bluntly serrate and notched, the larger ones often with shallow side-lobes, becoming glabrous and somewhat glossy above, pubescent beneath: fls. white or rose-tinted, 1-2 in. across, mostly on pubescent pedicels 1 in. and more long: fr. short-oblong, sometimes angled, about 1 in. long, dull green with light dots and a greasy feel, calyx persistent, the pedicels or "stems" 1-2 in. long, hardly edible. Ind. to Minn., Neb. and Mo., appearing in many forms.—Bechtel's Double-flowering Crab belongs here, a handsome plant. *P. iowensis*, Carruth (1877), is not identifiable from the original description, and specimens appear not to be preserved.

6. *P. Soulardi*, Bailey (*Malus Soulardi*, Britt.). SOULARD CRAB. A series of natural hybrids of Nos. 5 and 4, represented by the Soulard crab introduced many years ago by James G. Soulard, Galena, Ill., and by other pomological vars.: aspect of the apple-tree (*P. Malus*) with tinted fls. in close tomentose clusters: lvs. much like those of *P. ioensis* but with less tendency to become lobed: fr. 2-3 in. diam., apple-like, usually flattened endwise, yellow often with tinted cheek, more or less edible.

7. *P. spectabilis*, Ait. (*Malus spectabilis*, Borkh.). CHINESE FLOWERING APPLE. Small tree frequently planted for ornament, blooming earlier than the common apple: lvs. oval to oblong, 2-4 in. long, mostly much narrower than those of the apple, short-pointed or somewhat acuminate, either narrow or broad at base, finely and closely crenate-serrate, glabrous on both surfaces or soon becoming so, glossy above: fls. pink or rose, coral-red in bud,  $1\frac{1}{2}$ -2 in. across, sometimes double, on lightly pubescent pedicels mostly 1 in. or more long, calyx-lobes erect in anthesis: fr. roundish or round-ovoid,  $\frac{3}{4}$ -1 in. diam., yellow, without cavity at base, calyx persistent, flesh bitter. China; apparently unknown wild.—*P. micromalus*, Bailey (*Malus micromalus*, Makino). *M. spectabilis* var. *Kaido*, Sieb. *Pyrus spectabilis* var. *Kaido*, Bean). KAIDO CRAB. Probably a hybrid between *P. spectabilis* and *P. baccata* or *P. pulcherrima*: from No. 7 distinguished by the narrower lvs. narrowed at base into a slender petiole, large deeper colored fls., tomentose pedicels and calyx, and a subglobose fr. with depression at base and calyx sometimes deciduous.

8. *P. prunifolia*, Willd. (*Malus prunifolia*, Borkh.). PLUM-LEAF CRAB. Plant of uncertain standing, perhaps native in China but having the appearance of a range of hybrids between *P. Malus* and *P. baccata*: known only in cult.: small tree with pubescent young growths: lvs. ovate to broad-oval, 2-4 in. long, short-pointed or acuminate, irregularly crenate-serrate, becoming glabrous above but pubescent beneath: fls. white,  $1\frac{1}{2}$  in. across, on pubescent pedicels 1- $1\frac{1}{2}$  in. long: fr. globose or sometimes ovoid, 1 in. diam., green, yellowish, or red, with persistent calyx and cavity at base.—There is a weeping form.

Var. *robusta*, Bailey (*Malus robusta*, Rehd.). Supposed to be a hybrid between *P. baccata* and *P. prunifolia*, and one of the Crabs grown under the confused name *Pyrus cerasifera*; also grown as Siberian Crab (as Red Siberian) but the calyx persists on the fr. and the lvs. and young parts are more or less pubescent: it is a vigorous grower with large lvs.: petioles rather slender, somewhat pubescent; lf.-blades oblong to oblong-ovate: fr.  $\frac{3}{4}$ -1 in. diam., pale yellow striped and overlaid with bright red, the pedicels  $\frac{1}{2}$ -1 in. long.

Var. *Rinki*, Bailey (*Malus prunifolia* var. *Rinki*, Rehd. *M. Ringo*, Carr. *Pyrus Ringo*, Wenz.). RINGO CRAB. Small graceful tree to about 15 ft., more pubescent than *P. prunifolia* itself, petioles shorter, fls. pink; pedicels about 1 in. long: fr. 1- $1\frac{1}{2}$  in. diam., greenish or yellow, bitterish but edible, and cult. in Japan under the vernacular names Rinki and Ringo. Difficult to distinguish from var. *robusta*.

9. *P. angustifolia*, Ait. (*Malus angustifolia*, Michx.). SOUTHERN CRAB. Tree 20-25 ft. or more, with partially evergreen foliage and growth soon glabrous: lvs. lance-oblong to narrowly oblong-obovate, 1-3 in. long, apex rounded or mucronate, on some lvs. very short-acute, closely crenate-serrate or entire, soon glabrous above, sometimes retaining light pubescence on veins beneath; on vigorous shoots the lvs. may be ovate or elliptic and slightly lobed along the sides: fls. rose-colored and fragrant, about 1 in. across, on slender mostly glabrous pedicels about 1 in. long: fr. globose to somewhat pyriform,  $\frac{3}{4}$ -1 in. diam., yellow-green, with depressions on both ends. Va. to Fla. and Miss., in the coastal country; attractive in cult.; by some botanists considered to be a form of No. 10.

10. *P. coronaria*, L. (*Malus coronaria*, Mill.). GARLAND CRAB. Twiggy stiff-branched tree 20-30 ft. high, with thorn-like spurs and growths soon becoming glabrous: lvs. ovate to oval, 2-3 in. long, acute or acuminate, base rounded or cuneate, sharp-serrate and more or less notched, soon becoming glabrous; those on young shoots triangular-ovate and with 1-4 shallow lobes on either side: fls. bright rose as they open, then nearly white,  $\frac{3}{4}$ -1 in. or more across, on slender nearly glabrous pedicels mostly 1 in. or more long; calyx-tube glabrous, the lobes erect and tomentose inside: fr. oblate (depressed at ends), 1 in. diam., ridged about the depression at the apex, calyx persisting, yellow-green, hard and sour. Ont. to the mts. of N. C. and to Mo.; attractive in cult.

11. *P. Halliana*, Voss (*Malus Halliana*, Koehne). HALL CRAB. Neat attractive bush or small tree, 15-18 ft., with purple branchlets soon becoming glabrous: lvs. long-ovate or oblong, 2-3 in. long, firm in texture, acute or acuminate, very closely crenate-serrate or even entire, glabrous, glossy above, midrib usually purplish: fls. deep rose, 1- $1\frac{1}{2}$  in. across, on purple slender glabrous pedicels, 1 or more fls. in each cluster staminate; calyx purple, the lobes erect and nearly or wholly obtuse, short: fr. size of pea to  $\frac{1}{2}$  in. diam., purplish, on pedicels  $1\frac{1}{2}$  in. long, the calyx falling early, ripening late in autumn. W. China; introduced into N. Amer. from Japan by Dr. Geo. R. Hall (1820-1899).—The double-fl. form is var. *Parkmanii*, Bailey, it having been early grown by Francis Parkman, the historian, near Boston.

12. *P. baccata*, L. (*Malus baccata*, Borkh.). SIBERIAN CRAB. Strong wide-topped tree to 30-40 ft., with glabrous wiry growths: lvs. oval or ovate-lanceolate,  $2\frac{1}{2}$ -4 in. long, acuminate, closely crenate-serrate with callous serratures, rather thin, glabrous, the petioles long and slender: fls. white, about  $1\frac{1}{2}$  in. across, on glabrous green pedicels 2-3 in. long; calyx-lobes slender and glabrous: fr. size of a pea to nearly 1 in. diam., yellow or red, of a waxy look, on long slender pedicels, the calyx-lobes falling away. Siberia to Manchuria and N. China; common in cult.; some of the large jelly-crabs with persistent calices, as Hyslop, are supposed to be hybrids with *P. Malus*.—*P. baccata* becomes a distinct tree, like an apple-tree.

13. *P. pulcherrima*, Aschers. & Graebn. (*P. floribunda*, Hort., not Lindl. *Malus floribunda*, Sieb.). SHOWY CRAB. Commonly supposed to be a hybrid group issuing from *P. baccata* and *P. Sieboldi*, but lately considered probably a good species, introduced from Japan, presumably of Chinese origin: probably there are quite different races in cult. passing under the name: distinguished for its very profuse bloom, and the most popular of the flowering crabs: shrub or small tree sometimes reaching 25 ft., young parts pubescent but soon becoming glabrous: veneration conduplicate: lvs. ovate and usually acuminate, 2-3 in. long, not lobed but sometimes notched on vigorous shoots, the margins sharply or even incised-serrate, at first somewhat pubescent beneath but soon becoming glabrous, upper surface rather dull green: fls. rose or rose-red, usually fading white,  $1-1\frac{1}{4}$  in. across, appearing with the foliage, on slender somewhat pubescent pedicels  $1-1\frac{1}{2}$  in. long; calyx-tube pubescent and lobes acute; styles usually 4: fr. size of a pea or somewhat larger, red or yellowish, calyx usually falling, not long-persisting.—From *P. Halliana* distinguished by the conduplicate veneration, general absence of purple, young parts pubescent, sharp-serrate lvs., longer acute calyx-lobes, lightly pubescent calyx-tube and pedicels, absence of staminate fls., and usually rather smaller fls. From *P. baccata* it differs in smaller size of tree, veneration conduplicate, sharper-toothed lvs., shorter pubescent petioles, fls. darker-colored, mostly smaller fr. This crab is known mostly as *P. floribunda* but that name is antedated by *P. floribunda*, Lindl.; and although Lindley's plant is now commonly placed in the genus *Aronia* it is not finally removed from competition, for *Aronia* is not sufficiently distinct and it may at any time be recombined with *Pyrus*.

Var. *atrosanguinea*, Bean (*P. atrosanguinea*, Spaeth. *Malus atrosanguinea*, Schneid.). CARMINE CRAB. Fls. of deeper rose not fading white, lvs. shining and more glabrous and those on young shoots sometimes slightly lobed, shorter and nearly obtuse calyx-lobes, dark red fr. It may represent another parentage, perhaps *P. Halliana* and *P. Sieboldi*, but it falls well within the group known as *P. pulcherrima* until the group is more critically known.

Var. *Scheideckeri*, Bailey (*P. Scheideckeri*, Spaeth. *Malus Scheideckeri*, Zabel). Originated from seeds of *P. pulcherrima* at Scheidecker's nursery, Munich: later in bloom: fls. semi-double, pale pink: fr. globose,  $\frac{3}{4}$  in. diam., yellow, calyx usually persistent.

Var. *Arnoldiana*, Bailey (*Malus Arnoldiana*, Sarg.). SEEDLING OF *P. pulcherrima*, originated at the Arnold Arboretum, Boston: plant bushy: fls. one-half or more larger than in *P. pulcherrima*, pale rose: fr. much larger and yellow.

14. *P. Zumi*, Mats. (*Malus Zumi*, Rehd.). ZUMI CRAB. Low and much-branched tree of round head and twiggy close growth, 20 ft. and more: lvs. oblong to ovate-oblong,  $1\frac{1}{2}$ -3 in. long, acute, somewhat crenate but sometimes entire, those on young growths coarsely dentate, soon becoming glabrous, petioles long: fls. white or slightly pinkish, about 1 in. across, on pedicels about 1 in. long; styles 4 or 5: fr.  $\frac{1}{2}$  in. or less diam., globose, red, calyx deciduous. Japan; Zumi is a vernacular name.

15. *P. Sargentii*, Bean (*Malus Sargentii*, Rehd.). SARGENT CRAB. Bushy much-branched shrub, 3-5 ft., with pubescent young growths, the rigid branches often with thorn-like spurs: veneration conduplicate: lvs. ovate to elliptic-oblong, 2-3 in. long, very short-pointed, unequally sharp-serrate, slender-petioled, lightly pubescent on both surfaces when young but becoming glabrous above, dull green, those on vigorous young shoots ovate and usually 3-lobed: fls. clear white, 1 in. across, 5 or 6 in a cluster on slender glabrous pedicels about 1 in. long; calyx glabrous outside, lobes acuminate: fr. nearly globose,  $\frac{1}{2}$  in. or less diam., dark red with slight bloom, calyx deciduous. (Bears the name of C. S. Sargent, Director of the Arnold Arboretum.) Japan.—A related oriental species likely to attract attention is *P. toringoides*, (Osborn (*Malus toringoides*, Hughes. *P. transitoria* var. *toringoides*, Bailey). It bears profusely of creamy-white blossoms  $\frac{3}{4}$ -1 in. across borne 6-9 in a corymb, the styles being glabrous at base rather than pubescent; lvs. always lobed: fr. globular to somewhat pyriform,  $\frac{1}{2}$  in. diam., yellow or becoming nearly red in sun.



16. *P. Sieboldi*, Regel (*Malus Sieboldi*, Rehd. *Pyrus* and *Malus Toringo*, Sieb.). TORINGO CRAB. Shrub or small tree to 10–15 ft. and more, with pubescent young growth: vernation conduplicate: lvs. ovate to oblong-ovate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, short-acute or somewhat acuminate, strongly notched or lobed at or below the middle, the margins crenate-serrate or sharp-serrate on the shoots, pubescent on both surfaces but becoming glabrous: fls. rather small, about  $\frac{3}{4}$  in. across, bluish, on slender lightly pubescent pedicels; calyx-lobes triangular-ovate, about equaling the lightly pubescent or nearly glabrous tube: fr. size and shape of pea, yellow or red, shedding the calyx. (P. F. von Siebold, page 87.) Japan; known in several forms.

17. *P. fusca*, Raf. (*Malus fusca*, Schneid. *Pyrus rivularis*, Dougl.). OREGON CRAB. Tree to 30 ft. or more, or sometimes shrub-like, young growths more or less pubescent: lvs. ovate-lanceolate, 2–4 in. long, acute or acuminate, broad or cuneate at base, with appressed sharp glandular serrations, becoming dark green and glabrous above, mostly remaining more or less pubescent beneath, those on young shoots slightly 3-lobed: fls. white,  $\frac{3}{4}$  in. across, on glabrous or pubescent pedicels  $\frac{3}{4}$  in. or less long, appearing when foliage is nearly or quite full grown: fr. oblong,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, yellow or green and flushed red, shedding the calyx-lobes. N. Calif. to Alaska.—Not often in cult. but interesting as one supposed parent of *P. Dawsoniana*, Bailey (*Malus Dawsoniana*, Rehd., named for the late Jackson Dawson, propagator for the Arnold Arboretum), the other parent probably *P. Malus*: in habit like *P. fusca*: lvs. broader and more oval, more crenate-serrate and seldom lobed: fls. and frs. nearly twice as large; calyx persistent.

## 77. LEGUMINOSÆ. PEA or PULSE FAMILY

One of the major families, comprising herbs, shrubs, and trees, many of them climbing, inhabiting diverse situations in most parts of the world, widely varied in character but agreeing in the production of a true pod or legume; genera 450–500 and several thousand species, contributing many kinds for ornament and for food.—Lvs. prevailing pinnate but sometimes simple and sometimes digitate, alternate or only rarely opposite, usually stipulate and often stipellate: fls. mostly bisexual, 1 to many on terminal or axillary peduncles, the ovary usually 1 and 1-celled with mostly several or many ovules, style and stigma simple, sepals typically 5 and usually more or less united, and petals 5, but the floral parts various:—(1) corolla characteristically papilionaceous (“butterfly-like”) in Leguminosæ proper or Papilionatæ, like a pea flower, with 1 upstanding dorsal petal (*standard*, *vexillum* or *banner*), 2 lateral horizontal petals (*wings*), 2 lower ventral petals more or less united (*keel*), stamens mostly 10, the upper one of which is free and the other 9 united into a tube inclosing the long ovary, petals imbricate with the upper one outside; (2) in the Cæsalpineæ the corolla is not papilionaceous or only imperfectly so but still irregular and the petals mostly imbricate with the upper one inside, stamens 10 or fewer and usually distinct; (3) in the Mimoseæ the fls. are small and regular, petals valvate and mostly united below, stamens often numerous and distinct or variously united: fr. in the Leguminosæ is a 1-celled pod typically dehiscent by 1 or both sutures into 2 valves, but sometimes variously modified—as indehiscent, constricted between the seeds and breaking into joints, reduced to 1 seed and resembling a follicle, more or less fleshy and filled with pulp, spiny and indehiscent.—Although incapable of clear brief definition, the Leguminosæ is a natural group readily recognized by general characters and similarities; apparently all of the kinds may bear root-tubercles containing nitrogen-fixing bacteria. The family is here defined to include the senna and mimosa tribes or subfamilies; and the key is therefore divided into three major parts.

The lvs. afford good characters for use in keys. In some genera, as *Genista*, *Ulex*, and *Chorizema*, the lvs. are strictly simple; in certain others, as sometimes in *Hardenbergia* and *Kennedia*, they are reduced to 1 lft., the fact of





FIG. 10. STRUCTURES CRUCIFERÆ TO MALVACEÆ.

A, Brassica; mustard flower; cabbage silique at left. B, *Rosa rugosa*, showing perigyny of stamens; Bb, section through the hypanthium or calyx-tube, which is to form the hip. C, Apple flower, showing ovaries imbedded in hypanthium. D, *Rubus odoratus*, showing separate flower-bud and fruit. E, *Pisum sativum*: 1, standard; 2, wings; 3, keel; 4, calyx; 5, stamens; 6, staminal sheath, with one free stamen above it; 7, style. F, Clover, with separate flower, and fruit in the calyx. G, *Erodium*. H, Pistils and fruit of *Geranium*. I, *Oxalis*, showing elastically dehiscent pods. J, *Euonymus*. K, *Acer saccharum*. L, Two flowering buds of *Acer saccharinum*, at left showing pistillate flowers and at right staminate flowers with one pistillate flower. M, *Impatiens*; section of flower below; detachment of sepals and petals above. N, Hollyhock in lengthwise section, showing column of stamens, projecting styles, ovaries in the bottom. O, *Euphorbia corollata*; cyathium above; separate staminate flower, with its calyx-bract, below.

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reduction being determined by the presence of more than 1 lft. in related species or sometimes even on one plant and by the articulation of the single lft. Some of the Leguminosæ have digitate lvs., as *Trifolium* and *Lupinus*, known by the fact that all the lfts. are sessile on the end of the petiole. Most of the genera, however, bear pinnate lvs.; in many cases the lfts. are only 3, as in all the beans, but these are distinguished from digitate lvs. by the fact that the rachis is somewhat extended beyond the lateral pair so that the terminal lft. is stalked and articulated with the rachis.

1. The pea tribes: fls. papilionaceous; upper petal inclosing the others in bud.—PAPILIONATÆ (FABACEÆ).
  - A. Lfts. in even number, 2 or more, pinnate, all lateral, the terminal one being either wanting or usually represented by tendril or bristle: stamens monadelphous or diadelphous (9 or 10).
    - B. Pod ordinary, rather short and broad, not partitioned.
      - C. Plant herbaceous: stamens diadelphous (9 and 1).
        - D. Wings of corolla adherent to keel half or more their length.
          - E. Lobes of calyx leafy: style dilated at top, margins reflexed, bearded on one side. . . . . 1. PISUM
          - EE. Lobes long-subulate: style bearded down inner face. . . . . 2. LENS
          - EEE. Lobes short and broad: style bearded in tuft or ring at apex. . . . . 3. VICIA
          - DD. Wings free, or essentially so, from keel. . . . . 4. LATHYRUS
          - CC. Plant a woody climber: stamens 9, the odd one obsolete. . . . . 6. ABRUS
          - CCC. Plant a tree or shrub: stamens 9 and 1. . . . . 33. CARAGANA
        - BB. Pod short, constricted between the seeds, ripening underground. . . . . 7. ARACHIS
      - BBB. Pod long and slender, linear (usually 5 in. and more), partitioned between the seeds. . . . . 34. SESBANIA
    - AA. Lfts. 3.
      - B. Lf. pinnate (terminal lfts. stalked and articulate): stamens diadelphous (9 and 1), or monadelphous (exception under No. 28).
        - C. Style bearded or pilose at or toward the top (at stigmatic part): infl. racemose or subcapitate.
          - D. Calyx-lobes equaling or exceeding the tube.
            - E. Keel of corolla coiled (spiral). . . . . 8. PHASEOLUS
            - EE. Keel arched or curved but not coiled: stigma prominent.
              - F. Stigma strongly oblique or introrse: pods long and slender: roots not tuberous. . . . . 9. VIGNA
              - FF. Stigma subglobose on inner face of style: pod cross-lined: roots tuberous. . . . . 10. PACHYRHIZUS
              - FFF. Stigma terminal and subglobose: pod wide-winged. . . . . 11. PSOPHOCARPUS
            - EEE. Keel bent inward at right angles, beaked: pods short and broad: roots not tuberous. . . . . 12. DOLICHOS
          - DD. Calyx-lobes shorter than tube. . . . . 13. CLITORIA
        - CC. Style beardless on the stigmatic part.
          - D. Category of long-running twining vines.
            - E. Fls. in articulate knotted racemes, falling as they dry or as specimens are pressed.
              - F. Calyx 2-lipped, the lower lip much the shorter, and with small broad teeth or lobes. . . . . 14. CANAVALLIA
              - FF. Calyx 2-lipped or irregular but the lower teeth equally prominent and narrow-pointed.
                - G. Corolla very long, two to three times exceeding calyx. . . . . 15. STIZOLOBIUM
                - GG. Corolla short, not more than as long again as the calyx. . . . . 16. PUERARIA
            - EE. Fls. not in articulated racemes.
              - F. Keel mostly acute, about as long as the wings: fls. large (usually  $\frac{3}{4}$  in. or more long). . . . . 17. KENNEDIA
              - FF. Keel obtuse, shorter than wings: fls. small. . . . . 18. HARDENBERGIA
          - DD. Category of erect or spreading plants, not twiners.
            - E. Plant not prickly: mostly herbs.
              - F. Margins of lfts. entire.
                - G. Pod reduced to a single joint, covered in the calyx. . . . . 19. LESPEDEZA
                - GG. Pod of several distinct joints, much exceeding calyx. . . . . 20. DESMODIUM
              - H. Length of lfts. 1 in. or less. . . . . 21. LOTUS
              - HH. Length 2 in. or more
                - I. And ovate or broader. . . . . 22. GLYCINE
                - II. And lance-oblong. . . . . 23. CAJANUS
            - FF. Margins or at least apex of lvs. denticulate.

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- g. Pod small, spiral or coiled. .... 24. MEDICAGO
- gg. Pod small, ovoid, straight, not beaked ..... 25. MELILOTUS
- ggg. Pod short or several in. long, long-beaked. .... 26. TRIGONELLA
- EE. Plant prickly on sts. or petioles or both. .... 31. ERYTHRINA
- BB. Lf. digitate. (No. 21 is likely to be sought here, as lf. and lfts. are often sessile.)
- c. Stamens diadelphous (9 and 1). .... 27. TRIFOLIUM
- cc. Stamens 10, monadelphous.
- d. Pod swollen or inflated. .... 28. CROTALARIA
- DD. Pod flat, compressed, or linear.
- e. Ovary and pod stalked in the calyx. .... 52. LABURNUM
- EE. Ovary and pod sessile or essentially so. .... 53. CYTISUS
- ccc. Stamens 10 and free. .... 29. BAPTISIA
- AAA. Lfts. 5 or more.
- B. Lf. digitate. (No. 21 often looks to be digitate, when lf. and lfts. are sessile.)
- c. Pod swollen or inflated. .... 28. CROTALARIA
- cc. Pod flat or sometimes thickened, but not tumid. .... 30. LUPINUS
- BB. Lf. pinnate, the terminal lfts. present.
- c. Plants erect, or at least not climbing.
- d. Margin of lfts. serrate nearly all around: little herb. .... 5. CICER
- DD. Margin entire, except sometimes emarginate.
- e. Corolla of 1 petal (standard). .... 32. AMORPHA
- EE. Corolla complete, or at least of more parts than the standard.
- F. Infl. umbellate. .... 44. CORONILLA
- FF. Infl. not umbellate.
- G. Our species woody.
- H. Pod flat.
- i. Upper suture of pod margined or winged. .... 35. ROBINIA
- II. Upper suture marginless.
- J. Stamens diadelphous (9 and 1). .... 36. GLIRICIDIA
- JJ. Stamens 10, free. .... 37. CLADRASTIS
- HH. Pod moniliform, much constricted between the seeds. .... 38. SOPHORA
- HHH. Pod terete or turgid, sometimes bladdery-inflated.
- I. Petals long-acuminate. .... 39. CLIANTHUS
- II. Petals not so.
- J. Raceme short; fls. yellow or brownish. .... 40. COLUTEA
- JJ. Raceme many-fl'd.; fls. red varying to white.
- K. Fr. (in ours) inflated. .... 41. SWAINSONA
- KK. Fr. not inflated. .... 47. INDIGOFERA
- GG. Our species herbaceous. (No. 40 sometimes grown as an herb under glass.)
- H. Fls. in dense clover-like subtended heads. .... 42. ANTHYLLIS
- HH. Fls. racemose or sometimes solitary.
- i. Pod with only 1 or 2 seeds, muricate or crested. .... 43. ONOBRYCHIS
- II. Pod more than 2-seeded, in ours smooth.
- J. Wings not connate to keel; standard narrow. .... 45. GLYCYRRHIZA
- JJ. Wings somewhat joined to keel; standard very broad.
- K. Fls. showy; petals all clawed inside the glabrous calyx. .... 46. GALEGA
- KK. Fls. not showy; petals otherwise; calyx commonly hairy. .... 47. INDIGOFERA
- CC. Plants twining; lfts. entire.
- D. Style bearded. .... 13. CLITORIA
- DD. Style beardless.
- E. Number of lfts. 9 or more. .... 48. WISTERIA
- EE. Number of lfts. 5-7.
- F. Fls. in articulated or knotted racemes. .... 49. APIOS
- FF. Fls. not so.
- g. Keel mostly acute, about as long as wings. .... 17. KENNEDIA
- gg. Keel obtuse, shorter than wings. .... 18. HARDENBERGIA
- AAAA. Lfts. 1 or lvs. simple (reduced to phyllodia in No. 51, and often wanting in No. 54): woody plants. (In some species of Lotus, No. 21, the lvs. are apparently simple and clustered, but really pinnate with all parts sessile and the pinnæ 3-7 or more.)
- B. Plants twining vines; margins of lvs. entire.
- c. Keel mostly acute, about as long as wings. .... 17. KENNEDIA
- cc. Keel obtuse, shorter than wings. .... 18. HARDENBERGIA
- BB. Plant erect or diffuse, not twining.
- c. Pod inflated. .... 28. CROTALARIA
- cc. Pod not inflated.

- d. Lvs. sharp-toothed.....50. CHORIZEMA  
 DD. Lvs. entire.  
 E. Erect shrubs, very spiny.....51. ULEX  
 EE. Erect shrubs, not spiny in ours.  
 F. Calyx 2-lipped.  
 G. Seeds with appendage at base.....53. CYTISUS  
 GG. Seeds without appendage.....54. GENISTA  
 FF. Calyx 1-lipped.....55. SPARTIUM
2. The senna tribes: fls. irregular, imperfectly or not at all papilionaceous; upper petals inclosed by the others in the bud (petals 0 in No. 64); stamens mostly free: the usual cult. species are trees and shrubs.—CÆSALPINIÆ; mostly tropical.  
 A. Lvs. simple and entire.....56. CERCIS  
 AA. Lvs. simple and halved (notched or divided from the top into 2 lobes).....57. BAUHINIA  
 AAA. Lvs. pinnate or 2-pinnate, usually without terminal lft.  
 B. Petiole very short and rachis ending in a spine; pinnæ 2 or 4, the rachilla long, flat and twig-like, bearing numerous small deciduous lfsts.....58. PARKINSONIA  
 BB. Petiole ordinary.  
 C. Cult. for the bloom, the fls. large and showy.  
 D. Foliage evenly pinnate.....59. CASSIA  
 DD. Foliage evenly 2-pinnate (in ours).  
 E. Fls. 3 in. or more across; calyx-lobes valvate.....60. DELONIX  
 EE. Fls. smaller; calyx-lobes strongly imbricate.....61. POINCIANA  
 CC. Cult. for other purposes than the fls., which are small and not showy.  
 D. Petals present: lfsts. many and narrow.  
 E. Pod large and flat: ours thorny.....62. GLEDITSIA  
 EE. Pod tumid, constricted between the large seeds: unarmed.....63. TAMARINDUS  
 DD. Petals wanting: lfsts. few, large and broad.....64. CERAIONIA
3. The mimosa tribes: fls. small, regular, the petals valvate and usually united at or near the base, valvate (not overlapping) in bud; stamens few or many, exserted, free or monadelphous: most of the cult. kinds are trees and shrubs.—MIMOSÆ; mostly tropical.  
 A. Number of stamens 5–10.  
 B. Stamens about as long as petals, not showy.....65. ADENANTHERA  
 BB. Stamens exserted and showy.  
 C. Floral envelopes in 4's: fr. breaking up into 1-seeded joints when ripe: ours thorny.....66. MIMOSA  
 CC. Floral envelopes in 5's: fr. not breaking up when ripe: ours unarmed.....67. LEUCÆNA  
 AA. Number of stamens more than twice the number of floral envelopes, usually indefinite.  
 B. Stamens free.....68. ACACIA  
 BB. Stamens monadelphous, united at least at base.  
 C. Pod manifestly dehiscent.  
 D. Valves strongly elastically revolute from the apex; pod nearly or quite straight.....69. CALLIANDRA  
 DD. Valves splitting regularly: pod curled.....70. PITHECOLOBIUM  
 CC. Pod indehiscent.  
 D. Interior of thick pod septate and pulpy.....71. SAMANEA  
 DD. Interior of thin flat pod not so.....72. ALBIZZIA

1. **PISUM**, L. PEA. A half-dozen soft annual and perennial herbs in the Medit. region and W. Asia, one widely grown for food and fodder.—Lvs. pinnate, pinnæ 1–3 pairs, rachis ending in a branched (pinnate) tendril; stipules large and lf.-like: fls. white or colored, solitary or few-racemose in the axils; calyx oblique or gibbous at base, the lobes more or less leafy; corolla papilionaceous; wings somewhat adherent to keel; stamens 9 and 1: fr. a flattened dehiscent many-seeded pod. (Pi-sum: the classical name.)—The origin of the cult. pea is yet in doubt. The garden races have been separated as *P. hortense*, Aschers. & Graebn., coordinate with *P. arvense*; and it has also been held that they are derivatives of the European *P. elatius*, Stev. Until further investigations have developed new evidence, it is here intended to treat all the cult. races as forms of *P. sativum*, understanding the species in a broad sense.

**P. sativum**, L. GARDEN PEA. Smooth glabrous glaucous annual, 3–6 ft., climbing: lfsts. oval to oblong, 1–2 in. long, entire; stipules mostly larger than lfsts.,



denticulate on lower part: fls. 1-3, mostly white: pod 2-4 in. long, nearly straight on the back, with a stiff paper-like lining; seeds 2-10, wrinkled or plane, hypogeal in germination. Eu. and Asia; grown for the edible seeds.—Var. *humile*, Poir. EARLY DWARF PEA. Low,  $\frac{1}{2}$ -2 ft., scarcely climbing: pods small. Var. *macrocarpon*, Ser. EDIBLE-PODDED PEA. Pods soft, lacking the stiff papery lining, not dehiscent, sometimes 5 to 6 in. long, eaten together with the seeds.

Var. *arvense*, Poir. (*P. arvense*, L.). FIELD PEA. Lvs. sometimes marked gray: peduncles short, little exceeding the stipules: fls. colored, standard usually pinkish, wings purple, keel greenish: pod and seeds small. Grown for forage.

2. **LENS**, Moench. Small herbs, about a half-dozen species in the Medit. region and W. Asia, one cult. for food.—Erect or partially climbing: lvs. pinnate; pinnæ 2 to many pairs, narrow and entire, the terminal wanting or represented by tendril or bristle: fls. small and inconspicuous, whitish, solitary or few-racemose, papilionaceous; calyx-lobes very narrow; stamens 9 and 1; style bearded along inner face: fr. short, 1-2-seeded, compressed, the seeds lenticular. (Lens: the classical name, whence comes the English word *lens*, from the shape of the lentil seed.)

**L. esculenta**, Moench (*Ervum Lens*, L.). LENTIL. Lightly pubescent short-season branchy annual 10-18 in.: lfts. opposite or alternate, 4-14, about  $\frac{1}{2}$  in. long, oblong-oval to linear-oblong, lf. usually ending in a short tendril: fls. 1-3 on a slender axillary peduncle,  $\frac{1}{4}$  in. or less long, corolla equaled or exceeded by calyx-lobes: pod  $\frac{1}{2}$ - $\frac{3}{4}$  in. long and nearly as broad, containing 2 greenish-brown or dark-colored seeds or lentils convex on both sides; germination hypogeal. S. Eu.; much grown in Eu. for the edible seeds, but not often seen in this country.

3. **VICIA**, L. VETCH. Annual and perennial mostly tendril-climbing herbs of wide distribution in temp. regions, a few of them grown for food, ornament, forage, and green-manuring; recognized species perhaps 150.—Much like *Pisum*, *Lens*, and *Lathyrus*, differing in technical characters: fls. solitary or racemose; calyx-lobes short and broad; wings adherent to keel; style slender and not flattened, bearded at summit with tuft or ring of hairs; staminal tube oblique at its orifice, the stamens 9 and 1: fr. flat, mostly several- to many-seeded, the seeds globular or flattened; germination hypogeal. (Vic-ia: classical Latin name.)

Lvs. without tendrils.

- Pod 1 in. or more broad; seeds very large.....1. *V. Faba*
- Pod linear: seeds  $\frac{1}{8}$  in. diam.....2. *V. oroboides*
- Pod much constricted between seeds.....3. *V. Ervilia*

Lvs. tendril-bearing.

Fls. few, usually 1 or 2 in an axil; infl. sessile or nearly so.

- Lfts.  $\frac{3}{4}$  in. or more broad; stipules leafy.....4. *V. narbonensis*
- Lfts.  $\frac{1}{2}$  in. or less broad; stipules not prominent.

- Main lfts. oblong, oval or obovate.....5. *V. sativa*
- Main lfts. linear or nearly so.....6. *V. angustifolia*

Fls. several to many, 8 or more, the peduncle evident.

- Limb of standard equaling or exceeding its claw.....7. *V. Cracca*
- Limb of standard a half or less as long as claw.
- Pod pubescent.....8. *V. atropurpurea*
- Pod glabrous.....9. *V. villosa*

1. **V. Faba**, L. (*Faba vulgaris*, Moench). BROAD BEAN. Hardy erect glabrous simple-stemmed annual, 2-6 ft. or in dwarf forms 1-1 $\frac{1}{2}$  ft., very leafy: lfts. 2-6, mostly alternate, elliptic or oval to oblong, 2-4 in. long, commonly obtuse but apiculate, the terminal one wanting or represented by very rudimentary tendril: fls. 1 to several in the axils on a very short peduncle, 1-1 $\frac{1}{2}$  in. long, dull white with large purplish blotch: fr. large and thick, 2-4 in. and in certain vars. 1 ft. and more long; seeds strongly compressed and angled and 1 in. across, or in other races nearly globular and  $\frac{1}{4}$  in. diam., brown, green, purplish, or black. (Faba is the classical name for bean.) Probably native in N. Afr. and S. W. Asia; the bean of history grown for man and animals, cult. somewhat in the cooler parts of N. Amer. or as a cool-season crop; Mazagan, Windsor, Horse Bean, and English Bean are frequent names.

2. **V. oroboides**, Wulf. (*Orobis lathyroides*, Sibth. & Sm., not L.). Glabrous or somewhat pubescent perennial, grown for ornament, sts. mostly simple and erect,

1½ ft. or more: lfts. 1-3 pairs, ovate to oblong, tendril wanting: fls. 3-7, whitish to yellow, ¾in. or less long, short-pedicelled: pod linear-oblong, 1-1½ in. long; seed ⅜in. diam., globular, brown. S. E. Eu.

3. *V. Ervilia*, Willd. (*Ervum Ervilia*, L.). ERVIL. BITTER VETCH. Pubescent erect annual, 12-30 in., without tendrils, anciently grown for forage and also useful as a winter cover-crop in mild climates: lfts. 8-12 pairs, linear or nearly so, ½in. or less long: fls. 2-4, small, rose-colored, ¼-⅜in. long: pod 1 in. or less long, usually 3-4-seeded, much constricted between the brown angular-globose seeds. (*Ervilia* is an ancient name, used by Pliny for a legume.) S. Eu.; little known in this country.

4. *V. narbonensis*, L. NARBONNE VETCH. Annual, pubescent or glabrate, 2-4 ft., sometimes grown for forage: lfts. 2-3 pairs and a compound terminal tendril, oval to oblong, 2 in. or less long, obtuse but mucronate: fls. 1 or few, axillary, nearly or quite sessile, ¾in. or less long, purplish: pod linear or narrow, about 2 in. long; seeds dark gray, globular, ⅜-¼in. diam. S. Eu.

5. *V. sativa*, L. COMMON OR SPRING VETCH. TARE. Variable annual or biennial, not surviving winters in the N., grown for cover-crop and green-manuring, also for forage: sts. 2-3 ft., pubescent or glabrate: lfts. 4-8 pairs and a terminal tendril, oblong to oblanceolate, 1 in. or less long, truncate and apiculate: fls. usually 2 to an axil, short-pedicelled, 1 in. or less long, purplish: pod 2-3 in. long, pubescent at least when young, brown; seed brownish, about ⅜in. diam. Eu.; naturalized.—Runs into white-fl'd. races (var. *alba*, Beck), large-fl'd. and large-seeded (var. *macrocarpa*, Moris.), and scarlet-fl'd. (*V. fulgens*, Hort., not Batt.).

6. *V. angustifolia*, L. NARROW-LEAVED VETCH. Differs from No. 4 in the linear to linear-oblong and attenuate lfts., smaller fls., shorter and narrower black pod; matures earlier. Eu.; naturalized and sometimes used for forage.

7. *V. Cracca*, L. Perennial, usually lightly pubescent, sts. 2-4 ft. long and climbing or trailing, sometimes offered for ornament: lfts. 4-12 pairs, linear to linear-oblong, about ¾in. long, tendrils prominent: racemes one-sided, densely many-fl'd.; fls. purplish (varying to white), about ½in. long: pod ¾-1 in. long, glabrous, 5-8-seeded. (*Cracca*: Latin for vetch.) Eu., Asia, and N. Amer.

8. *V. atropurpurea*, Desf. PURPLE VETCH. Annual, softly white-hairy, sts. 3-6 ft. long, weak, grown for cover and green-manuring particularly on the Pacific coast: lfts. 7-9 pairs, oval, 1 in. long more or less, blunt or truncate but mucronate, tendril prominent and branched: fls. 10-24 in a rather close raceme, about ¾in. long, whitish at base and amaranth-purple at top: pod broad, 1-1½ in. long, hairy-pubescent; seeds 4 or 5, velvety-black with prominent white scar. S. Eu.

9. *V. villosa*, Roth. HAIRY OR WINTER VETCH. Annual or biennial, much used for cover and green-manuring in orchards, surviving the winter at the N., villous, sts. reaching several ft.: lfts. 5-10 pairs, linear-oblong, 1 in. or less long, tendrils prominent and branched: fls. many in long rather loose one-sided racemes, violet-blue (rarely white), about ¾in. long: pod 1 in. or less long, pale, glabrous; seeds 2-8, small, globose, nearly black. Eu., Asia, sometimes escaped in this country.

4. LATHYRUS, L. VETCHLING. More than 100 annual and perennial herbs in the northern hemisphere and some species in S. Amer., yielding good ornamental subjects and some of them grown for food and forage.—From *Vicia* the genus differs technically in the flattened style bearded down the inner face, and the wings in the corolla nearly or quite free from the keel: usually tendril-bearing vine-like or seldom erect plants with winged or mostly strongly angled sts. and commonly pinnate lvs., and mostly colored and showy fls. in the axils, usually racemose; stamens 9 and 1, or sometimes all united at base, the sheath scarcely oblique at the opening: pod mostly flat, sometimes terete, dehiscent, not septate, the seeds several to many; germination hypogeal. (Lathyrus: ancient Greek name for some leguminous plant.)

A. Plants tendril-bearing, vine-like.

B. Lfts. 1 pair.

C. Fls. 1-3 (seldom 4 in cult.).

D. Sts. erect or diffuse, 30 in. or less, scarcely climbing; foliage grass-like.

DD. Sts. long and tendril-climbing.

E. Shape of lfts. oval to broad-oblong.

1. *L. sativus*

- F. Fragrance slight: standard much larger than wings and keel. 2. *L. grandiflorus*  
 FF. Fragrance pronounced: standard little exceeding other petals..... 3. *L. odoratus*  
 EE. Shape of lfts. linear-lanceolate..... 4. *L. tingitanus*  
 CC. Fls. several to many, usually more than 3.  
 D. Stipules large and foliaceous, often 1 in. and more long..... 5. *L. latifolius*  
 DD. Stipules small, not foliaceous.  
 E. Shape of lfts. linear-lanceolate..... 6. *L. sylvestris*  
 EE. Shape ovate..... 7. *L. rotundifolius*  
 BB. Lfts. 2 or more pairs..... 8. *L. splendens*  
 AA. Plants without tendrils, bushy (*Orobus*).  
 B. Lfts. ovate-acuminate..... 9. *L. vernus*  
 BB. Lfts. oval, not tapering..... 10. *L. niger*

1. *L. sativus*, L. GRASS PEA. Annual, mostly under 30 in., erect or nearly so, grown in some countries for food and also for forage: sts. winged, glabrous: lfts. 1 pair, linear and long-pointed, 2-3 in. long, stipules long and resembling lfts., tendril branching: fls. solitary and long-pedicelled, about  $\frac{1}{2}$  in. long, white tinged blue on the standard: pod 1-1 $\frac{1}{2}$  in. long, broad and flat, glabrous; seeds few, white, angled, usually wedge-shaped. S. Eu., Asia; little known in this country.

2. *L. grandiflorus*, Sibth. & Sm. Long-running glabrous perennial, grown for the very showy fls.: sts. winged: lfts. 1 pair (rarely more), large, 1-1 $\frac{1}{2}$  in. long, ovate and obtuse but mucronulate, undulate, the tendrils branched, stipules small: fls. 2 or 3 on long peduncles, slightly fragrant, rose-purple, the orbicular standard 1-1 $\frac{1}{2}$  in. across and much exceeding the other petals: pod linear, 3 in. long. S. Eu.

3. *L. odoratus*, L. SWEET PEA. Tall-climbing lightly pubescent annual grown for the showy very fragrant fls.: st. winged: lfts. 1 pair, oval or oblong, 1-2 in. long and usually  $\frac{1}{2}$  in. or more broad, short-acute and mucronate, stipules small and not foliaceous, tendrils branched: fls. usually 1-3, sometimes 4, on stout peduncles exceeding the lvs., about 1 in. long, the standard now sometimes 2 in. across and not greatly exceeding the wings, purple with lighter wings but now much modified in color, size, and conformation: pod about 2 in. long, pubescent; seeds several or many, nearly globular, gray-brown. Italy.—Var. *nanellus*, Bailey. DWARF SWEET PEA. A recent race, the plant very condensed, not climbing; well represented in the kind known as Cupid.

4. *L. tingitanus*, L. TANGIER PEA (as the Latin name signifies). Annual climber infrequently grown for its brilliant fls. which are not sweet-scented: sts. winged, glabrous: lfts. 1 pair, linear-lanceolate and pointed, about 2 in. long: fls. usually 2, sometimes 3, on long peduncles, the purple standard about 1 in. across and much exceeding the scarlet wings and keel: pod flat, 3-5 in. long, glabrous; seeds oblong and compressed,  $\frac{1}{4}$  in. or more long, light brown darker marks. W. Medit. region.

5. *L. latifolius*, L. EVERLASTING PEA. Well-known climbing glabrous long-lived perennial, planted for its profuse bloom: st. long, strongly winged: lfts. 1 pair, ovate-lanceolate, 2-4 in. long, acute and mucronate, prominently 3- or 5-nerved, stipules lanceolate and lf.-like and lobed at base, tendrils stout and branched: fls. several to many on a peduncle exceeding the lvs., rose-color (varying to darker colors and to white), standard very large and 1 in. or more across: pod compressed, 3-5 in. long, containing several or many strongly angled seeds. Eu.

6. *L. sylvestris*, L. FLAT PEA. Long-lived glabrous perennial, somewhat grown for forage: sts. winged, 3-6 ft.: lfts. 1 pair, lanceolate or linear-lanceolate, with winged petiole, the tendril branched: fls. about 4-10, and  $\frac{1}{2}$  in. long, on peduncle equaling the lvs., the raceme loose; standard rose-colored with green spot on back, wings purple at top, keel greenish: pod 2-3 in. long, lanceolate; seeds globose and wrinkled. Eu. and S. W. Asia.

7. *L. rotundifolius*, Willd. Low glabrous perennial grown for ornament: sts. winged: lfts. 1 pair, ovate to roundish, 3-5-nerved, stipules very acute: fls. many on peduncles surpassing the lvs., large, rose-pink: pod compressed; seeds globose. Russia and eastward.

8. *L. splendens*, Kellogg. PRIDE-OF-CALIFORNIA. Slender half-shrubby perennial raised for its showy bloom: sts. angled, lightly pubescent, becoming several ft. long: lfts. 2-5 pairs, ovate-oblong or narrower, about 1 in. long, obtuse or retuse at apex but mostly also apiculate, stipules toothed, tendril branched: fls. 6-12, about 1 in. and more long, on stout peduncles that exceed the lvs., pale rose or violet to magenta-red; upper teeth of calyx short: pod 2-3 in. long, flat, glabrous, with prominent beak. S. Calif., where it is also planted, and sometimes grown under glass.

9. *L. vernus*, Bernh. (*Orobis vernus*, L.). SPRING VETCHLING. Low perennial, 1-2 ft., grown for ornament: sts. nearly or quite erect from a tough mass of fibrous roots, striate, glabrous, little-branched: lfts. 2-3 pairs, thin, ovate-acuminate,  $1\frac{1}{2}$ -3 in. long, with 2 side veins from the base, stipules amplexicaul-ovate, tendril wanting: fls. 5-8, about  $\frac{3}{4}$  in. long, in a loose peduncled raceme, blue-violet, nodding and short-pedicelled: pod slender, about  $1\frac{1}{2}$  in. long, glabrous, with several brown globose-angled seeds. Eu.

10. *L. niger*, Bernh. (*Orobis niger*, L.). BLACK VETCHLING. Low perennial, 1-2 ft., planted for ornament, the herbage turning black in drying: sts. erect or bushy, from hard rhizome-like roots, nearly glabrous, finely striate, branched: lfts. 5-8 pairs, oval,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, apiculate and mostly obtuse, the stipules sharply lance-acuminate, tendril wanting: fls. 6-12, about  $\frac{1}{2}$  in. long in a rather close slender-peduncled raceme, purple, horizontal or nodding, very short-pedicelled: pod slender, about  $1\frac{1}{2}$  in. long, glabrous, with black globose somewhat angled seeds. Eu.

5. *CICER*, L. A dozen or so W. Asian small annuals and perennials, one grown for its edible seeds.—Lvs. pinnate, the rachis ending in a spine or abortive tendril but in ours the terminal lft. foliaceous and normal, all dentate or serrate, stipules large and usually toothed: fls. small, white or purplish, solitary or few in the axils, papilionaceous; standard broad, clawed; wings free; stamens 9 and 1; ovary sessile, 2-ovuled or more, the style incurved or inflexed and glabrous: fr. short, turgid; seeds large; germination hypogeal. (Ci-cer: classical name.)

*C. arietinum*, L. CHICK-PEA. GARBANZO. Annual, 1-2 ft., erect, branched, glandular-pubescent: lfts. 9-15, opposite or alternate, oval or oblong or somewhat obovate,  $\frac{3}{8}$ - $5\frac{1}{8}$  in. long, obtuse, closely serrate: fl. solitary, long-pedicelled, white or tinted,  $\frac{3}{4}$ - $\frac{3}{8}$  in. long: pod  $\frac{3}{4}$ -1 in. long and  $\frac{1}{2}$  in. broad; seeds 1 or 2, nearly or quite  $\frac{3}{8}$  in. cross-diam., wrinkled, with a point on one end, bearing a fancied resemblance to a ram's head (whence the name *arietinum*), whitish, red, or black. Probably from W. Asia; long cult. in many countries.

6. *ABRUS*, L. Slender or climbing more or less woody plants widely spread in the tropics, of 6 species, one of them sometimes grown under glass or in the open far S.—Lvs. abruptly pinnate, without tendrils but the rachis sometimes ending in a point, the lfts. many: fls. small, in short mostly dense axillary racemes, papilionaceous; standard broad, more or less joined at base to the staminal tube, the wings shorter and narrower than keel; stamens 9, monadelphous; ovary many-ovuled, the short incurved style glabrous: fr. commonly short and more or less septate between the seeds. (A-brus: Greek *delicate*, referring to the small lfts.)

*A. precatorius*, L. ROSARY PEA. Woody twiner, 10 ft. or more, lightly appressed-hairy: lfts. numerous and close together, oblong with broad ends,  $\frac{1}{2}$  in. or less long, entire, minutely apiculate, easily falling: fls. red to purple, seldom white, about  $\frac{3}{8}$  in. long: pod flat and broad,  $1\frac{1}{2}$  in. or less long, close-pubescent; seeds ovoid,  $\frac{1}{4}$  in. or less long, shining, brilliant scarlet with lower third black. Tropics; seeds used in bead-work, and also for rosaries (whence *precatorius*, from Latin *precator*, one who prays).

7. *ARACHIS*, L. Low trop. herbs, most or all of them Brazilian, from 7-10 species, one widely planted for the edible seeds and the herbage used for forage.—Lvs. abruptly pinnate, mostly of 2 pairs of lfts. and no tendril, stipules prominent and adnate to base of petiole: fls. solitary or few in the axils, papilionaceous; standard broad and large; wings free from the beaked keel; stamens 9 and 1, diadelphous or sometimes 9 and monadelphous: fr. maturing under ground, indehiscent, more or less constricted between the seeds. (Ar-achis: meaning and application obscure.)

*A. hypogæa*, L. PEANUT. GOOBER. GROUNDNUT. Annual, 10-20 in. high, lightly hairy, branched: lfts. 4, oval to oval-obovate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, obtuse or short-pointed, entire, long-peduncled, stipules linear-pointed and 1 in. or more



long: showy fls. yellow and sterile, soon withering; fertile fls. on stout recurving stipes, without envelopes, soon entering the ground where the ovary ripens into the reticulated pod (or "nut") containing 1-3 edible seeds with constrictions; in germination the cotyledons come to the surface of the ground. Probably S. Amer.

8. PHASEOLUS. L. BEAN. A wide range of annuals and perennials, mostly in warm and trop. countries, usually herbs but a few woody at base, grown somewhat for ornament but mostly for the edible seeds and pods; the known species are probably 150-200, when the extensive synonymy shall have been reduced. Mostly twining, some forms erect: lvs. pinnately 3-foliolate but sometimes reduced to 1 lft., stipulate and stipellate, the stipules persistent, lfts. entire: fls. few to many, racemose or fascicled on axillary peduncles, white, yellow, red, purple, papilionaceous, closely subtended by 2 bracts like an outer calyx which are sometimes deciduous; lobes of calyx equaling or exceeding its tube; keel coiled, being the distinctive mark of the genus; stamens 9 and 1; style bearded longitudinally: fr. compressed or with convex sides, several- to many-seeded, dehiscent; germination hypogeal or epigeal. (Phaseolus: ancient name.)—The species of Phaseolus in general cult. are few, but the oriental kinds are in the country and should be understood.

- A. Color of fls. white, cream-colored, violet or red.
  - B. Lfts. retuse or at least obtuse: plant with deep fleshy perennial root: fls. reddish-purple. .... 1. *P. Metcalfei*
  - BB. Lfts. acute or pointed: annual or grown as annuals.
    - c. Seeds (beans) on the small oblong or globular order, usually  $\frac{3}{8}$  in. or less long, not broad or prominently flattened.
      - d. Calyx-bracts small and inconspicuous, much shorter than calyx itself. .... 2. *P. acutifolius*
      - DD. Calyx-bracts broad and prominent, ovate, nearly equaling or exceeding calyx. .... 3. *P. vulgaris*
    - CC. Seeds on the large broad order, usually nearly or quite as wide as long, often very flat.
      - d. Fls. large and showy, mostly more than  $\frac{1}{4}$  in. long, white or scarlet. .... 4. *P. coccineus*
      - DD. Fls. small,  $\frac{3}{8}$  in. or less long, white or cream-color.
        - e. Calyx-bracts oval, strong-veined: pod thin-edged with sharp long beak. .... 5. *P. lunatus*
        - EE. Calyx-bracts linear, not strongly veined: pod thick-edged, large, with blunt or short tip. .... 6. *P. limensis*
  - AA. Color of fls. clear yellow: oriental beans.
    - B. Lfts. entire, or sometimes broadly 2- or 3-lobed.
      - c. Plant and pods very hairy or even shaggy: seeds usually dull.
        - d. Seeds (beans) oblong, blackish, with concave hilum or scar: pod long-hairy. .... 7. *P. Mungo*
        - DD. Seeds nearly or quite globular, green, brown, yellow, rarely blackish, the hilum not concave: pod short-hairy. .... 8. *P. aureus*
      - CC. Plant and pods glabrous or only thinly hairy: seeds glossy.
        - d. Pods constricted between seeds: hilum or scar not concave. .... 9. *P. angularis*
        - DD. Pods continuous: hilum concave. .... 10. *P. calcaratus*
    - BB. Lfts. parted to base into 3-5 narrow divisions. .... 11. *P. aconitifolius*

1. *P. Metcalfei*, Woot. & Standl. (*P. retusus*, Benth., not Moench). METCALFE BEAN, introduced as a forage plant in the S. W. by J. K. Metcalfe. Perennial, with a large fleshy deep root: sts. puberulent, trailing 10-12 ft. or more: lvs. thick, rhombic to oblong, 2-3 in. long and nearly as broad, obtuse and usually retuse, rough-puberulent on both sides, with prominent veins: fls. many on rigid peduncles scarcely exceeding the lvs., reddish-purple; calyx hairy; bracts subulate and short: pod flat, broad-oblong,  $1\frac{3}{4}$ - $2\frac{1}{2}$  in. long, somewhat curved; seeds circular, compressed,  $\frac{5}{8}$  in. across, brown-black. New Mex., Ariz., Mex.

2. *P. acutifolius*, Gray, var. *latifolius*, Freem. TEPARY BEAN. Slender lightly pubescent or glabrate annual, bushy on poor land but otherwise making a twining vine several ft. long: lfts. ovate to broad-lanceolate, 2-3 in. long, pointed, entire, petioles 1-4 in. long: fls. 2-5 on peduncles mostly much shorter than lvs., white or light violet, about  $\frac{1}{8}$  in. long; calyx-bracts very small and deciduous: pod 2-3 in. long and about  $\frac{1}{8}$  in. broad, compressed, rimmed on the margins, prominently sharp-beaked, finely pubescent; seeds roundish to oblong,  $\frac{1}{4}$ - $\frac{3}{8}$  in. long, convex or somewhat flattened, white, yellow, brown or bluish-black. Ariz. and Mex.; introduced as a drought-resistant food-plant for the dry beans; germination epigeal.

3. *P. vulgaris*, L. KIDNEY BEAN. The common garden pole bean (Haricot of the French), grown for the dry or somewhat immature ("shell") seeds and some vars. for the edible pods ("string" beans). Annual, pubescent, tall-twining: lfts. broad-ovate to rhombic-ovate, 4-6 in. long, entire, long-acuminate: fls. few at or near the apex of peduncles shorter than lvs., white, ochroleucous, or violet-purple,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; calyx-bracts broad, ovate-pointed, strongly several-nerved, mostly equaling the calyx: pod slender with convex or rounded sides, pubescent or glabrate, straight or somewhat curved, 4-8 in. long, with prominent beak; seeds globular to oblong, mostly not exceeding  $\frac{5}{8}$  in. long and often much less, white, brown, blue-black or speckled in great variety; germination epigeal. Probably of American origin; cult. in such vars. as Horticultural Pole bean, Old Homestead, Dutch Case-Knife, Kentucky Wonder, Creaseback.—Var. *humilis*, Alef. (*P. nanus*, Auth., not L.), is the common Bush Bean, differing in its low stature and non-climbing habit.

4. *P. coccineus*, L. (*P. multiflorus*, Willd.). MULTIFLORA BEAN. SCARLET RUNNER. Perennial but grown as an annual, tall-twining: lfts. broadly rhombic-ovate, 3-5 in. long, entire: fls. several to many, mostly  $\frac{3}{4}$ -1 in. long, on strong long peduncles nearly equaling the lvs. and sometimes exceeding them, bright scarlet; calyx-bracts lanceolate to linear-lanceolate and about equaling the calyx: pod 4-12 in. and more long, plump, lightly pubescent or glabrate, beak rather stout; seeds broad-oblong,  $\frac{3}{4}$ -1 in. long and two-thirds as broad, not tapering at ends, convex-flattened, nearly black with red markings; germination hypogeal. American tropics; grown mostly as an ornamental.—Var. *rubronanus*, Bailey. Bushy, not climbing: fls. red or scarlet; not often seen. Var. *albus* (*Lipusa multiflora*, var. *alba*, Alef.). WHITE DUTCH RUNNER. Fls. and seeds white; grown mostly for the edible seeds. Var. *albonanus*, Bailey. Plant bushy, not climbing: cult. for its white beans; it has been grown as a dwarf lima.

5. *P. lunatus*, L. SIEVA BEAN. Slender lightly pubescent or glabrate annual, with thin lvs.: lfts. not very large, broad-ovate, 2-3½ in. long, entire, sharp-pointed, thin in texture: fls. many, small,  $\frac{3}{8}$  in. or less long, white or ochroleucous, many in a long open peduncled raceme of variable length; calyx-bracts oval, nearly or quite equaling calyx, with strong central and usually 2 side nerves: pod 2-3½ in. long, flat, about  $\frac{3}{4}$  in. broad, thin-edged, often broadening toward the apex, papery in texture and slightly pubescent, the beak very sharp and often strongly ascending, early dehiscing into twisting valves; seeds flat and thin, about  $\frac{1}{2}$  in. long, rhomboidal in outline, with radiating lines, white, brown, red or speckled; germination epigeal. Trop. Amer.; much cult., a heavy cropper; known also as Carolina, Civet, and Sewee Bean.—Var. *lunonanus*, Bailey. DWARF SIEVA BEAN, known also as dwarf lima: bush form, not climbing. Var. *salicis*, Bailey. WILLOW-LEAF BEAN. Lfts. narrow-lanceolate to linear-lanceolate, 3-6 in. long,  $\frac{1}{2}$ -¾ in. broad.

6. *P. limensis*, Macf. LIMA BEAN. Perennial but grown as annual, a much stouter stronger higher-climbing later-flowering plant than No. 5, pubescent, with thick heavy lvs.: lfts. long-angular-ovate or lance-ovate, 3-5 in. long, long-pointed but not sharp, thick in texture: fls. much as in No. 5, but calyx-bracts only one-third as long as calyx: pod large, thick and heavy, 3-5 in. long and often 1 in. broad, margins thick and sometimes double-ridged, the beak short, stout and blunt, tardily dehiscing; seeds larger than in No. 5, plump, white; germination epigeal. Probably trop. Amer. Var. *limenanus*, Bailey. Bush or DWARF LIMA. Plant bushy, not climbing.

7. *P. Mungo*, L. URD. BLACK GRAM. Plant spreading, 1-3 ft. high, prominently hairy, annual: lfts. ovate to rhombic-ovate, 2-4 in. long, acuminate-pointed: fls. at the summit of a short peduncle that elongates in fr., yellow,  $\frac{1}{4}$  in. or less long; calyx-bracts linear and equaling or exceeding the keel: pod nearly terete, 1½-2 in. long, erect or spreading, long-hairy, with a very short hooked beak; seeds oblong with square ends,  $\frac{1}{8}$  in. or a little more long, mostly black, with white concave hilum; germination epigeal. Probably native in India; there is a twining form.

8. *P. aureus*, Roxb. MUNG. GREEN or GOLDEN GRAM. Annual, a taller and more erect plant than No. 7, sometimes slightly twining at the tips: calyx-bracts ovate: pod 2½-4 in. long, slender, very short-hairy; seeds rather smaller, usually green, sometimes yellow and brown, the white hilum not concave; germination epigeal. (Mung and Mungo are native vernacular names.) Not known wild, but probably Indian.

9. *P. angularis*, Wight. ADZUKI BEAN. Bushy and erect annual, 1-2½ ft. high: lfts. ovate to rhombic-ovate, 2-3½ in. long, entire or shallowly 3-lobed, abruptly short-pointed: fls. bright yellow, 2-12 on axillary short peduncles; calyx-

bracts ovate-lanceolate: pod cylindrical,  $2\frac{1}{2}$ -5 in. long and  $\frac{1}{4}$  in. or less broad, glabrous, constricted between the seeds when mature, with short blunt beak; seeds 6-10, oblong, about  $\frac{1}{4}$  in. or less long, squared or slightly rounded at ends, not flattened, in many colors, as red-brown, blue-black, maroon, straw-colored to nearly white, with long white hilum not concave; germination hypogeal. Asia; much grown in Japan and China and best known of the oriental beans in this country.

10. *P. calcaratus*, Roxb. RICE BEAN. Half-climbing annual, from 12-30 in. high and making sts. 3-6 ft. long: lfts. ovate to broad-ovate, often somewhat rhombic,  $2\frac{1}{2}$   $3\frac{1}{2}$  in. long, short-acute to acuminate, entire or rarely 3-lobed: fls. bright yellow, several to many in axillary racemes; calyx-bracts subulate, much exceeding the calyx: pod slender, 3-5 in. long and about  $\frac{1}{4}$  in. broad, mostly curved or falcate, finely pubescent or glabrous, the beak prominent but not sharp; seeds 6-10, oblong,  $\frac{1}{4}$   $\frac{1}{2}$  in. long, rounded at ends, with a straight concave hilum, brown, maroon, black, straw-colored; germination hypogeal. Asia.

11. *P. aconitifolius*, Jacq. MOTH BEAN. Distinguished by the lfts. being divided into 3-5 narrow lobes  $\frac{1}{4}$   $\frac{1}{2}$  in. broad: trailing or diffuse lightly hairy annual 1-2 ft. high: fls. yellow, very small, in close clusters on the ends of axillary peduncles, the bracts narrow and long-pointed: pod 1-2 in. long, nearly cylindrical, glabrous, with short blunt beak; seeds 5-7, very small, oblong,  $\frac{1}{8}$   $\frac{1}{4}$  in. long, somewhat rounded at the ends, clay-colored or marbled with black, the hilum small; germination hypogeal. Probably native in India.

9. *VIGNA*, Savi. Herbs of warm and trop. countries, probably 60 species or more, two or three of which are grown for food and forage.—*Vigna* differs technically from *Phaseolus* in the fact that the keel is arched or curved inward rather than coiled and the fls. usually few and somewhat capitate (or close) rather than open-racemed: mostly twining, and ours annual: lvs. pinnately 3-foliolate, stipulate: fls. whitish, yellowish, or purplish, mostly in alternate pairs on ends of very long peduncles, often falling soon after opening, the bracts caducous, and usually cushion-like nectaries between the fls.; standard broad and large, exceeding the wings, auricled at base; stamens 9 and 1; style bearded along inner side, the stigma lateral and oblique or introrse beyond which is a short beak: fr. slender and often very long, nearly terete and sometimes slightly inflated; seeds various, small, not broad and flat. (*Vigna*: Dominicus Vigna, Italian scientist of the 17th century.)—Most *vignas* are annual; a few are perennial and some of them are somewhat woody. Three species are in common cult., very likely all forms of one.

Pod more than 1-3 ft. long, pendent, more or less inflated and flabby when green.....1. *V. sesquipedalis*

Pod 12 in. or less, hard and firm, not at all inflated or flabby when green.

Seed mostly more than  $\frac{1}{4}$  in. long: pod 8-12 in. long, pendent.....2. *V. sinensis*  
Seed mostly less than  $\frac{1}{4}$  in. long: pod 3-5 in. long, erect or ascending. 3. *V. Catjang*

1. *V. sesquipedalis*, W. F. Wight (*Dolichos sesquipedalis*, L. *V. sinensis* var. *sesquipedalis*, Koern.). ASPARAGUS BEAN. YARD-LONG BEAN. Strong long-running glabrous or glabrate annual: lfts. rhomboid-ovate, 3-5 in. long, entire or seldom obscurely angled, the mature ones very short-pointed: fls. ochroleucous or violet,  $\frac{3}{4}$   $1\frac{1}{2}$  in. long, 2 or 3 on the end of a long peduncle, opening in early morning and closed flat by noon then soon falling; calyx-lobes lance-acuminate: pod at length hanging, often prone on the ground, upward of 1-3 ft. long and mostly less than  $\frac{1}{2}$  in. broad, rather thick or fleshy, soft and somewhat inflated or flabby, shrinking when dry; seed  $\frac{3}{8}$   $\frac{1}{2}$  in. long and little more than half as broad, oblong or long-reniform, rounded at ends, not much if any compressed, mostly brown with a long white hilum; germination epigeal. Probably S. Asian, but now widely spread, and grown for forage and human food; the long seeds and long soft shriveling pods distinguish the species; *sesquipedalis* is Latin for a foot and a half, but the pods do not always reach that length.

2. *V. sinensis*, Endl. (*Dolichos sinensis*, Stickm.). COWPEA. Like No. 1 in herbage: pod 8-12 in. long, pendent, not flabby or inflated when green; seeds about  $\frac{1}{4}$   $\frac{1}{2}$  in. long, usually smaller than in No. 1, globose to short-reniform, in many shades and markings, the solid colors being mostly brown, clay, white, maroon, purplish, and nearly black. Probably Asian.

3. **V. Catjang**, Walp. (*Dolichos Catjang*, Burm.). CATJANG (an oriental vernacular name). Less developed in its pods, which are only 3-5 in. long and erect or only spreading, not flabby or inflated; seeds small, mostly not  $\frac{1}{4}$  in. long, oblong or cylindrical or slightly reniform, about as thick as broad. Probably Asian; little known in cult.

10. **PACHYRHIZUS**, Rich. YAM BEAN. Probably 3 species of tall twining perennial plants grown for their edible tuberous roots, little known in our territory; they inhabit the tropics of both hemispheres.—Sts. herbaceous or woody at base, hairy, pubescent or glabrate: lfts. 3, often lobed or strongly angled; stipellate: fls. blue or white, on fascicled pedicels in racemes with swollen nodes, bracts setaceous and caducous; standard very broad, auriculate at base; keel obtuse and incurved; stamens 9 and 1; style compressed above and bearded along inner side, the stigma more or less globose, tip involute: fr. large, narrow, compressed or turgid, depressed or constricted between the ovate or very broad flattened seeds. (*Pachyrhizus*: *thick root*.)

Terminal lft. entire or only sinuate.....1. *P. tuberosus*  
Terminal lft. lobed.....2. *P. erosus*

1. **P. tuberosus**, Spreng. Tuberous root very large: sts. 10-20 ft. long: lfts. 3-6 in. long, the terminal rhomboid-acuminate, lateral unsymmetrical and more or less triangular, all entire or only sinuate: fls. white,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; wings as long as standard and keel somewhat exceeding wings: pod 8-12 in. long and nearly 1 in. broad, beaked, reddish-hairy; seeds 6-8, large, about 1 in. or less long and  $\frac{1}{2}$  in. broad, usually red, said to be poisonous. Probably S. American, but widely spread in tropics; root and young pods eaten.

2. **P. erosus**, Urb. (*P. angulatus*, Rich.). Lfts. with angular lobes: fls. violet or reddish: pods about one-half as long as in No. 1. Tropics.

11. **PSOPHOCARPUS**, Neck. Five twining tuberous-rooted herbs in the tropics of Asia and Afr., one introduced as a food plant in trop. and subtrop. parts.—Lfts. 3, stipellate, and the stipules 2-parted: fls. prominent, few or several in a close nodulose raceme terminating an axillary peduncle, purplish; calyx slightly 2-lobed, the lower lobes blunt and equaling the upper; standard broad, auricled at base; keel incurved; stamens 9 and 1, the odd one sometimes free only at base; style prominent and incurved, stigma terminal with dense hairs around and below it: fr. long, square in cross-section and 4-winged, filled between the seeds. (*Psophocarpus*: Greek combination alluding to the sound the frs. make when they explode, being laid in the sun.)

**P. tetragonolobus**, DC. GOA BEAN. ASPARAGUS PEA. Annual, making an edible root tuber, and also prized for the edible young pods: st. glabrous: lfts. broad-ovate or deltoid-ovate, acuminate, 3-6 in. long: fls. bright blue, about  $1\frac{1}{4}$  in. long: pod 6-9 in. long and 1 in. broad including the jagged wings; seeds nearly globular,  $\frac{1}{4}$  in. or somewhat more across, brown and shining, smooth, with very small hilum. India.

12. **DOLICHOS**, L. Trop. annual and perennial herbs and subshrubs, prostrate or partially erect but mostly long-twining, a few grown for ornament and the edible seeds; species probably upwards of 50, mostly in the eastern hemisphere.—*Dolichos* is technically distinguished by the narrow keel bent inward and upward at right angles rather than curved as in *Vigna* or coiled as in *Phaseolus*; the stigma is terminal, below which the style is bearded: lvs. pinnately 3-foliolate, stipellate, the stipules very small: fls. white, reddish to purple, solitary, or usually somewhat fascicled in nodulose racemes; standard very broad, auricled at base; wings adnate to the keel; stamens 9 and 1: fr. large, flat, usually curved, beaked; seeds globose or flattened. (*Dolichos*: old Greek name of a bean.)

Pod  $\frac{1}{2}$  in. or more broad at maturity and 2 in. or more long.....1. *D. Lablab*  
Pod linear, about 1 in. long.....2. *D. lignosus*



1. *D. Lablab*, L. (*Lablab vulgaris*, Savi). HYACINTH BEAN. BONAIVIST. LABLAB (Egyptian name adopted by Linnæus). Potential perennial, but grown as an annual, immensely variable and therefore assuming many cultural forms: sts. twining, lightly hairy to glabrate, usually 5-10 ft. but sometimes reaching 30 ft. and some forms are dwarf or bush: lfts. very broad-ovate, the lateral ones lopsided, 3-6 in. long and sometimes equally broad, rather abruptly slender-acuminate: fls. purple or white, 2-4 at each node in an elongating raceme,  $\frac{1}{2}$  to nearly 1 in. long: pod flat, 1-2½ in. long, close-pubescent or smooth, papery, straight or somewhat curved on back but very convex in outline on front with a long upward curve toward the very prominent slender beak, sometimes truncate-retuse at end; seed black or nearly so (white in the white-fl. forms), flat, oblong with rounded ends,  $\frac{1}{2}$  in. or less long, the hilum and raphe long and prominent; germination epigeal.—Probably Old World tropics but now widely cult. for food; prussic acid (poisonous) has been found in seeds of colored kinds; a "stringless" form, eaten as are string beans, has thick whitish retuse pods 3 in. and more long and 1 in. broad and borne 6-9 together, white fls., very large lvs. and heavy growth; the name "hyacinth bean" is more properly applied to the common ornamental form with showy violet-purple fls., purple-tinged sts., and black or purple-black seeds, known in the variety *Darkness*; the white-fl. forms, as in *Daylight*, are less known as ornamentals.

2. *D. lignosus*, L. AUSTRALIAN PEA. Evergreen somewhat woody perennial, slender, lightly pubescent: lfts. small, about 1½ in. or less long, triangular-ovate-acuminate and apiculate: fls. white or rose-purple, less than ½ in. long, few in a close cluster on the end of an elongated peduncle: pod about 1 in. long, glabrous, containing black seeds. Probably Asian.

13. *CLITORIA*, L. BUTTERFLY PEA. Twining perennial herbs or shrubs, of some 30 species in warm and temp. countries, 1 in N. Amer.; one species is grown for ornament under glass in the N. and in the open far S.—Lfts. 3-9, with persistent stipules, stipels always present: fls. axillary, large and showy, solitary or racemose, white, blue, reddish, violet; calyx tubular, the 5 teeth shorter than or not exceeding the tube; standard large and erect, not appendaged; wings somewhat adherent to the short keel; stamens 9 and 1, more or less imperfectly diadelphous; style long and incurved, hairy on the inner side: fr. stipitate, long and narrow, compressed. (*Clitoria*: an old name of no significance.)

*C. ternatea*, L. Tall slender climber with pubescent sts.: lfts. 5-7, oval or oblong, obtuse, 1-2 in. long; fls. solitary and nearly sessile, 1-1½ in. long, the calyx subtended by orbicular bracts, corolla bright blue with lighter markings: pod 3-4½ in. long, ½ in. broad, flat; seed nearly black. Tropics, probably Asian but widely spread; name from the island of Ternate in the Moluccas.

14. *CANAVALIA*, DC. Annual and perennial erect or strong twining and trailing herbs, one or two grown far S. for ornament and the edible beans; about two dozen or more species widely spread in the tropics.—Lfts. 3, mostly coriaceous: fls. rather large, papilionaceous, white, rose, bluish or violet, in tubercled axillary racemes; calyx 2-lipped, the upper lip much exceeding the lower; standard orbicular, the sides turned back; wings narrow and free; keel incurved; stamens 10, monadelphous or one partly free; style incurved with the keel, beardless, the small stigma terminal: fr. large and woody, flat, with a strong rib on either side near upper margin; seeds large and flat. (*Canavalia*: an aboriginal name.)

Plant erect: hilum half as long as seed.....1. *C. ensiformis*  
 Plant twining: hilum nearly as long as seed.....2. *C. gladiata*

1. *C. ensiformis*, DC. JACK BEAN. Erect or semi-erect, 2-4 ft., glabrate: lfts. ovate-oblong to elliptic, 3-5 in. long, acute or acuminate and mucronate: fls. purple, 1 in. or more long, in pendulous racemes 10-15 in. long: pod 8-14 in. long and about 1 in. broad, slightly curved, ridges moderately marked and sides usually plane; seeds 10-14, ¾ in. long and about ½ in. broad, compressed but plump, white, with brown hilum one-half their length; germination epigeal. W. Indies.

2. *C. gladiata*, DC. SWORD BEAN. Twining: pod 10-12 in. long, about 1½ in. broad, much curved, ridges very strong, often wrinkled on the sides or valves; seeds

$\frac{3}{4}$ –1 in. long, very flat, usually red, pink or brown, the narrow hilum running nearly their length. Old World tropics.

15. **STIZOLOBIUM**, P. Browne (*Mucuna*, Adans., in part). **VELVET BEAN**. Annual very strong twiners, about a dozen species from the Old World tropics, some of them planted far S. for forage and also for ornament.—Lfts. 3, broad, with bristle-like stipels; stipules small, lanceolate: fls. large and prominent, papilionaceous, mostly in 3's in long nodulose racemes, early shedding,  $1\frac{1}{4}$ – $1\frac{3}{4}$  in. long, white or dark purple; calyx 2-lipped, lower teeth at least equaling the upper; standard much shorter than keel which is straight for part of its length and then curved upward; stamens 9 and 1; style filiform, usually pubescent nearly to tip but not bearded, the stigma terminal and small: fr. turgid and thick or sometimes flattened, heavy, more or less ridged lengthwise, hairy or velvety; seeds large, subglobose to oblong; germination hypogeal. (*Stizolobium*: Greek compound *stinging pods*, from the hairs on the first described species.)—Several species have been introduced into the U. S. for test, but only two or three are yet prominent.

|   |                           |
|---|---------------------------|
| Fls. dark purple: pods with velvety-black pubescence.....   | 1. <i>S. Deeringianum</i> |
| Fls. dark purple: pods with appressed white pubescence..... | 2. <i>S. Hasjoo</i>       |
| Fls. and pubescence of pods white.....                      | 3. <i>S. nireum</i>       |

1. **S. Deeringianum**, Bort (*Dolichos multiflorus*, Hort., not Torr. *Mucuna Deeringiana*, Small). **FLORIDA VELVET BEAN**. Running to great length, even 50 ft. and more, somewhat white-pubescent: lfts. ovate or rhomboid-ovate, 2–6 in. long, entire, acuminate and cuspidate, pubescent beneath and less so above: fls. 5–30 in a long pendent raceme or thyrses, solitary or mostly 2 or 3 together, purple,  $1\frac{1}{2}$  in. or more long; calyx large, white-pubescent, upper lip broad-triangular, middle lobe beneath longest; standard less than half length of keel: pod 2–3 in. long, turgid, ridged, densely nearly black-pubescent; seeds 3–5, nearly globular, speckled, streaked, and marbled brown or black on a whitish ground, hilum less than half length of seed. Probably S. Asia or Malaya; first described from plants growing in Fla., and dedicated to William Deering, patron of hort. in that state.

2. **S. Hasjoo**, Piper & Tracy. **YOKOHAMA BEAN**. Slender, to 20 ft., sparingly white-pubescent: lfts. ovate, somewhat acute and abruptly mucronate, 4–5 in. long, slightly white-pubescent above and beneath: fls. dark purple,  $1\frac{1}{2}$  in. long, in racemes 4–6 in. long; calyx saccate, densely pubescent, lower lobe half longer than lateral ones: pod 3– $4\frac{1}{2}$  in. long, with white appressed pubescence and prominent side ridge; seeds 3–6, oblong and flattened something like a plump lima bean, ash-colored, sometimes blackened at the ends. Probably Japanese; Hasjoo is a vernacular name; an early-maturing species.

3. **S. niveum**, Kuntze. **LYON BEAN**. Known by its undulate lf. surfaces, very long fl.-clusters, white fls., white-pubescent strongly ridged pods 4–5 in. long, and flattish seeds. Probably S. Asia and Philippines.

16. **PUERARIA**, DC. About a dozen species of perennial twining herbs and shrubs, in farther Asia and Pacific Isls., one much planted for arbors and other ornament.—Lfts. 3, large, stipellate, sometimes lobed; stipules present, sometimes herbaceous: fls. blue or purple, in long axillary knotted racemes, papilionaceous, the narrow bracts early caducous; calyx more or less 2-lipped, half or more as long as petals; standard broad, auricled at base; wings somewhat adherent to keel; stamens 9 and 1; style incurved, beardless, the stigma apical and small: fr. long and narrow, more or less flattened, many-seeded. (*Pueraria*: bears the name of a European botanist, N. Puerari.)

**P. hirsuta**, Schneid. (*P. Thunbergiana*, Benth. *Dolichos japonica*, Hort.). **KUDZU-VINE**. Very long-running hairy vine, somewhat woody, with tough thickened or tuberous roots: lfts. broad-ovate to rhombic-ovate or nearly orbicular, 3–6 in. long, entire or shallowly lobed, abruptly very sharp-pointed, hairy-pubescent: fls. purple,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, in a long dense axillary raceme from which the narrow pointed bracts soon fall, appearing in late summer and fragrant: pod large, flat, hairy. China, Japan.

17. **KENNEDIA**, Vent. About a dozen more or less woody trailers and twiners, Australian, grown under glass and in the open in Calif. for ornament.—Sts. usually pubescent or hairy: lfts. commonly 3, sometimes 5 or even only 1, stipellate, entire or 3-lobed; stipules present, often prominent: fls. red to purple-black, large and usually showy, papilionaceous, often long and slender, axillary, sometimes solitary but usually in pairs, umbels or racemes; calyx somewhat 2-lipped, the 2 upper lobes united; standard broad, auriculate at base; wings about as long as the acute keel and joined to it; stamens 9 and 1; style inflexed, beardless, the stigma terminal: fr. narrow, flattened or terete, septate between seeds. (Kenned-ia: Lewis Kennedy, died 1818, of the English nursery firm of Kennedy & Lee. See page 11.)

Fls. nearly black, slender.....1. *K. nigricans*  
Fls. red, broad.....2. *K. prostrata*

1. **K. nigricans**, Lindl. (*Lotus nigricans*, Hort.). Robust pubescent twiner: lfts. mostly 3, sometimes 1, broad-ovate to rhomboid-ovate, 2–4 in. long, entire, obtuse and often emarginate: fls. secund-racemose, about 1 in. long, narrow, purple-black with green blotches on standard; keel and wings of similar length: pod flattened.

2. **K. prostrata**, R. Br. Sts. pubescent to nearly glabrous: lfts. 3, broad-obovate to orbicular, entire, not 1 in. long, stipules large and cordate: fls. scarlet, about  $\frac{3}{4}$  in. long, 2–4 terminating a long peduncle: pod nearly cylindrical, pubescent.—Var. **major**, DC. (*K. Marryattæ*, Lindl.). A larger and more hairy plant, the lvs. strongly undulate and stipules sometimes as much as 1 in. across: fls. deep scarlet and larger.

18. **HARDENBERGIA**, Benth. Three woody Australian twining vines, grown as are the Kennedias, differing in technical characters: fls. small, more numerous in the raceme, not running to very dark reds or purple-blacks, keel obtuse and shorter than the wings; lfts. in one species reduced to 1. (Hardenbergia: named after Franziska, Countess of Hardenberg.)—The genus is sometimes united with Kennedia.

Lfts. 3 or 5.....1. *H. Comptoniana*  
Lft. 1.....2. *H. monophylla*

1. **H. Comptoniana**, Benth. (*Kennedia Comptoniana*, Link). Lfts. 3, sometimes 5 and then the lateral ones 2 close together on either side, oval to narrow-lanceolate,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. long, obtuse: fls. blue or violet-blue (a white var.), less than  $\frac{1}{2}$  in. long, in 2's, 3's, or 4's along the raceme: pod flat or at least compressed,  $1\frac{1}{2}$ –2 in. long. (Named in honor of Lady Northampton, the family name being Compton.)

2. **H. monophylla**, Benth. (*K. monophylla*, Vent.) Lft. commonly 1, 2–4 in. long, ovate, oblong-ovate, to narrow-lanceolate, obtuse: fls. less than  $\frac{1}{2}$  in. long, white, rose, violet but not blue, in 2's or 3's in long prominent racemes: pod turgid.

19. **LESPEDeza**, Michx. BUSH CLOVER. Mostly upright perennial herbs and subshrubs, rarely annual, 40–50 species in N. Amer., Asia, and Australia, a few of the oriental kinds grown for ornament and one for forage.—Lfts. 3 (or rarely reduced to 1 but not in ours), entire, usually small, without stipels; stipules small: fls. small but often numerous and showy although prevailingly not conspicuous, often of two kinds, one bearing papilionaceous petals and mainly sterile and the other apetalous and fertile; calyx with 5 nearly equal lobes; standard obovate or oblong and clawed; keel incurved; stamens 9 and 1; ovary 1-ovuled, the style incurved and beardless, stigma small and terminal: fr. more or less included in calyx, of only 1 fertile joint. (Lespedeza: Lespedez was Spanish governor of Fla. and patron of Michaux.)—Lespedeza and Desmodium (Meibomia) are closely related, and some of the species may be placed in either genus.

Plant annual, decumbent or ascending, grown for forage.....1. *L. striata*  
Plant perennial, upright, grown for the showy bloom.  
Fls. purple.

|  |                       |
|--|-----------------------|
| Lfts. oval or broad-obovate, obtuse although apiculate: calyx-lobes not sharp..... | 2. <i>L. bicolor</i>  |
| Lfts. elliptic-pointed: calyx-lobes long-pointed.....                              | 3. <i>L. formosa</i>  |
| Fls. white.....  | 4. <i>L. japonica</i> |

1. *L. striata*, Hook. & Arn. JAPAN CLOVER. Annual, tufted and much branched, somewhat pubescent, decumbent or ascending to 18 in. and sometimes more: lfts. numerous and small,  $\frac{3}{4}$  in. or less long, oblong or obovate, obtuse, nearly sessile: fls. small, 1-3 in an axil, pink or purple, not conspicuous: pod acute, surpassing the calyx-lobes. China and Japan; grown in some of the southern states for hay and forage; also naturalized.

2. *L. bicolor*, Turcz. Shrub, 4-10 ft.: lfts. oval or round-obovate,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, obtuse or rounded at apex, apiculate: fls. purple,  $\frac{1}{4}$ - $\frac{3}{8}$  in. long, many but less numerous and showy than in No. 3, in shorter erect or ascending racemes, midsummer to autumn; calyx-lobes blunt or at least not long narrow-pointed: pod  $\frac{1}{4}$  in. long, freely produced, lightly pubescent. Japan.

3. *L. formosa*, Koehne (*L. Sieboldi*, Miq. *Desmodium penduliflorum*, Oudem.). Subshrub or in the N. an herb from perennial root, 4-10 ft., lightly pubescent: lfts. elliptic or elliptic-oblong, 1-2 in. long, short-pointed and apiculate, light colored and appressed-hairy beneath: fls. rose-purple, in late summer and autumn, about  $\frac{1}{2}$  in. long, numerous and showy, in drooping or flexuose long panicked racemes; calyx-lobes narrow and long-pointed: pod (not often produced, at least in the N.) about  $\frac{1}{2}$  in. long, pubescent. Japan.

4. *L. japonica*, Bailey (*Desmodium japonicum*, Hort., not Miq.). Much like No. 3 but a week or two later in blooming, sts. and herbage nearly glabrous and lighter-colored, lfts. broader and less pointed, fls. pure white. Japan; infrequent in cult. here.

20. **DESMODIUM**, Desv. (*Meibomia*, Heist.). TICK TREFOIL. Some 170 or more perennial or sometimes annual herbs, frequently woody at base, in temp. and trop. regions in the western hemisphere, and in Australia and S. Afr.—The genus differs technically from *Lespedeza* in the lfts. being stipellate and the fr. consisting of several joints that soon break apart. (*Desmodium*: Greek for a chain, from the connected joints of the pod.)—None is regularly in cult. or domesticated, but one is grown far S. for hay, forage, and cover-cropping.

*D. tortuosum*, DC. BEGGARWEED. Annual or grown as such, erect, branched, hairy-pubescent, 6-8 ft.: lfts. ovate, oblong or elliptic, 3-4 in. long, obtuse but apiculate, more or less pubescent at least beneath, the stipels subulate: fls. blue to purple, in simple or somewhat branched racemes 6-12 in. long; bracts narrow, two or three times longer than calyx, deciduous: pod 3-6-jointed, pubescent, undulate on both edges, twisted when young but becoming flat. W. Indies, somewhat naturalized in southernmost U. S.

21. **LOTUS**, L. Herbs or sometimes subshrubs, 80-100 species in the Medit. region and other parts of the Old World, a few cult. for ornament and food; Hosackias in W. N. Amer. have been referred to this genus, but are generally regarded as distinct.—Plants erect: lvs. various and often puzzling—sometimes lfts. apparently 3 on an evident petiole but with 2 other lfts. (sometimes interpreted as stipules) at the base of the apparent petiole which is then considered to be rachis, at other times 3, 4, 5, or more narrow lfts. sessile on the st. as if separate small simple lvs.: fls. papilionaceous or sometimes modified, solitary, twin or umbellate, subtended, yellow, purple to white; calyx-teeth narrow-acute, nearly or quite equal; standard broad; keel pointed; stamens 9 and 1; style glabrous: pod cylindrical, mostly several-seeded, 2-valved. (*Lotus*: classical name applied to different plants.)—The genus is not homogeneous.

|  |                             |
|--|-----------------------------|
| Pod 4-winged.....                                    | 1. <i>L. tetragonolobus</i> |
| Pod not winged.....                                  |                             |
| Fls. papilionaceous.....                             |                             |
| Lfts. broad, ovate to obovate.....                   | 2. <i>L. corniculatus</i>   |
| Lfts. narrow, linear to linear-oblong.....           | 3. <i>L. jacobaeus</i>      |
| Fls. hardly papilionaceous, with beak-like keel..... | 4. <i>L. Berthelotii</i>    |



1. *L. tetragonolobus*, L. (*Tetragonolobus purpureus*, Moench). WINGED PEA. Annual, spreading on ground, hirsute, sts. 6-16 in. long; main lfts. 3, elliptic to somewhat obovate, about 1 in. long and nearly as broad, entire: fls. 1 or 2, purplish-red, about  $\frac{3}{4}$  in. long, the slender calyx-lobes one-half length of corolla: pod 2-3 in. long, 4-sided and 4-angled, containing spherical-oblong smooth brown seeds  $\frac{1}{2}$  in. crosswise. (*Tetragonolobus* means *four-angled pod*, used also as a generic name for this plant.) S. Eu.; the seeds and young pods are eaten.

2. *L. corniculatus*, L. BIRDS-FOOT TREFOIL. Perennial with many decumbent or ascending hirsute or glabrate sts. 6-24 in. high: lfts. 5, of which 2 are stipular, ovate to oblanceolate,  $\frac{1}{2}$  in. long more or less: fls. 3-10, umbellate, yellow sometimes tinged red, about  $\frac{1}{2}$  in. long: pod linear, about 1 in. long. Eu. and Asia, and adventive in N. Amer. and elsewhere; cult. for ornament, with a double-fl. form, and useful for forage.

3. *L. jacobæus*, L. ST. JAMES TREFOIL (as the name suggests, from the island of Santiago or St. James, of the Cape Verdes). Perennial, somewhat shrubby, 1-3 ft.: lfts. 3-5, practically sessile to the st., linear,  $\frac{1}{2}$  in. long, slightly hairy: fls. 3-6, sessile in an umbel, about  $\frac{1}{2}$  in. long, black-purple varying to yellow on same plant: pod cylindrical, glabrous.

4. *L. Berthelotii*, Masf. (*L. peliorhynchus*, Hook. f.). Gray-pubescent much-branched bush, 2 ft.: lfts. 3-7, narrow-linear, about  $\frac{1}{2}$  in. long, sessile to st., looking like small fascicled lvs.: fls. few together, about 1 in. long, scarlet fading orange, varying to dark-crimson and spotted, standard narrow and recurved, keel long-pointed and exceeding the wings, making an odd bloom. (Named for Sabin Berthelot, author, with Webb, of the "Flore des îles Canaries"; sometimes mistakenly written *Bertholetii*.) Cape Verde and Canary Isls.; grown under glass and in Calif.

22. **GLYCINE**, L. Trop. and warm-temp. mostly twining plants of the Old World, one grown for human food and forage; species perhaps 40 or more.—Lfts. mostly (and in ours) 3, sometimes 5 or 7, stipellate; stipules small and free from the petiole: fls. small, white to purplish, in short axillary racemes, papilionaceous; calyx hairy, the 2 upper teeth more or less united; standard rather broad, somewhat auricled at base; wings lightly adherent to the short obtuse keel; stamens mostly monadelphous, the odd one sometimes partially free; style beardless, stigma small and terminal: pod narrow, flat or with somewhat convex sides, usually constricted between the seeds. (Glycine: Greek *sweet*, probably from edible qualities of some plant.)

**G. Max**, Merr. (*Phaseolus Max*, L. *Glycine hispida*, Maxim. *G. Soja*, Sieb. & Zucc. *Soja Max*, Piper). SOYBEAN. Erect brown-hairy bushy annual, 2-6 ft., some of the shoots vine-like: lfts. 3, ovate to narrow-ovate, 3-6 in. long, entire, obtuse or short-acute, apiculate: fls. inconspicuous, white or purple: pods hanging on very short stalks, 2-3 in. long and about  $\frac{1}{2}$  in. broad, brown, hairy; seeds 2-4, globose, green, brown, yellow, or black, with small hilum; germination epigeal. China, Japan; much grown for forage, human food, and oil; known also as Coffee-Bean.

23. **CAJANUS**, DC. One erect small shrub, much grown in trop. and sub-trop. countries for its edible seeds, probably native to the Old World.—Lfts. 3, entire, with minute resinous dots beneath: fls. in axillary racemes, papilionaceous; calyx with 2 upper lobes united; standard large and broad, auricled at base; keel obtuse and incurved; stamens 9 and 1; style thickened upward, beardless, the stigma terminal: pod compressed, with diagonal depressions. (*Cajanus*: from an aboriginal name.)

**C. Cajan**, Millsp. (*C. indicus*, Spreng.). PIGEON PEA. Pubescent shrub 4-10 ft. or more, much branched: lfts. lanceolate to narrow-elliptic, 2-4 in. long, acuminate, soft-pubescent on both surfaces: fls. yellow or orange, brownish on back, varying into other color combinations,  $\frac{3}{4}$  in. across: pod 2-3 in. long and  $\frac{1}{2}$  in. broad more or less, long-beaked, hairy, abundantly produced; seeds orbicular with one edge flattened, compressed, about  $\frac{1}{4}$  in. across, usually brown with small white hilum.

24. **MEDICAGO**, L. MEDICK. Species about 50 in Eu., Asia and Afr., mostly weedy plants, some of them grown or used for forage.—Mostly herba-

ceous, annual and perennial, seldom woody, erect or wide-spreading; lvs. pinnate; lfts. 3, small, mostly denticulate, without apparent stipels; stipules adnate to petiole: fls. small, yellow or violet, in axillary short racemes or heads, papilionaceous; calyx-teeth nearly equal; standard oblong or obovate, not auricled; stamens 9 and 1; style subulate, beardless, stigma capitate: fr. spiral or much curved, small, indehiscent, smooth or spiny, 1- to few-seeded. (Medica-go: indirectly from Medea, the country whence alfalfa was supposed to have been derived.)—Only one species, a perennial, is regularly sown to any extent over a wide range of country, but a few of the yellow-fl. annuals are more or less used for hay and are established as introduced plants, as: *M. lupulina*, L., Hop Clover or Black Medick, with curved 1-seeded smooth pods; *M. hispida*, Gaertn. (*M. denticulata*, Willd.), Toothed Bur Clover, with several-seeded loosely spiral spiny pods without furrowed edges; *M. arabica*, Huds., Spotted Bur Clover, with compactly spiral spiny pods with furrowed edges.

*M. sativa*, L. ALFALFA. LUCERNE. Upright glabrous branched perennial, 1-3 ft., with very deep tap-root: lfts. obovate-oblong to linear-oblong,  $\frac{3}{4}$ -1 in. long, denticulate toward apex: fls. purplish, in close racemes  $\frac{1}{2}$ -1 in. long: pod slightly pubescent, with 2 or 3 spirals. Eu.; naturalized.

25. *MELILOTUS*, Mill. MELILOT. SWEET CLOVER. Some 20 species of Old World annual and biennial sweet-smelling erect herbs, somewhat grown for forage, green-manuring, and rarely for ornament.—Lvs. pinnate; lfts. 3, small and mostly narrow, denticulate, without apparent stipels; stipules adnate to petiole: fls. small, white or yellow, in slender axillary racemes, papilionaceous; calyx-teeth nearly equal; standard oblong or obovate, not auricled; wings longer than the obtuse keel; stamens 9 and 1; style slender, incurved above, beardless, stigma small and terminal: fr. very short, straight, mostly ovoid, 1-2-seeded, tardily or not at all dehiscent. (Melilo-tus: *honey lotus*, from the fragrance.)

|                  |                     |
|------------------|---------------------|
| Fls. white.....  | 1. <i>M. alba</i>   |
| Fls. yellow..... | 2. <i>M. indica</i> |

1. *M. alba*, Desr. WHITE SWEET CLOVER. Familiar roadside biennial weed, and also sown for forage, cover-crop, and green-manuring mostly under the name Bokhara Clover; erect, glabrous or above finely pubescent, 3-10 ft.: lvs. fragrant when dried; lfts. narrowly or broadly oblong,  $\frac{3}{4}$ -1½ in. long, denticulate, obtuse or emarginate: fls. many, white, honey-sweet,  $\frac{1}{8}$  to less than  $\frac{1}{4}$  in. long, short-pedicelled, in long slender racemes: pod  $\frac{1}{8}$ - $\frac{3}{8}$  in. long, ovoid, tipped with style but not beaked. Eu., Asia.—Var. *annua*, Coe, is a race maturing the same year from seed, known specially in the Hubam Clover.

2. *M. indica*, All. Used on the Pacific coast as a cover-crop and also naturalized in parts of the country; glabrous, 1½-3 ft.: lfts. cuneate-obovate,  $\frac{1}{2}$ -1¼ in. long, truncate or retuse at apex, denticulate above the middle: fls. yellow, smaller than in No. 1, in racemes 1-2 in. long: pod small, nearly globose, irregularly wrinkled or alveolate. Eurasia.—The common yellow sweet clover of the eastern and central part of the country, *M. officinalis*, Lam., naturalized from Eu. and common along roadsides, is distinguished by ovate not truncate lfts., fls. twice or more larger, pod larger and cross-wrinkled.

26. *TRIGONELLA*, L. Seventy or more species of annual seldom perennial herbs, mostly with strong odor, of the Old World, 1 in Australia, 1 in S. Afr., a few of which are sometimes grown for forage and other uses, one for ornament.—Mostly low plants with pinnately 3-foliolate usually denticulate lvs., with stipules adnate to petiole: fls. yellow, white, or blue, solitary, capitate or short-racemose in the axils: fr. a beaked long or short indehiscent pod. From Medicago it is distinguished by the straight rather than spiral pod; from Melilotus by the beaked pod, more capitate infl. and sometimes blue fls.; from

Trifolium by the pinnate lvs. and exserted pod. (Trigonella: a little triangle, Latin, of obscure application.)

- Fls. white; pod 3 in. or more long. .... 1. *T. Fœnum-Græcum*  
 Fls. blue; pod not much longer than calyx. .... 2. *T. cœrulea*

1. *T. Fœnum-Græcum*, L. FENUGREEK (i. e. Greek hay). Pubescent simple-stemmed heavy-scented annual, 1-2 ft., grown for forage and seeds used for medicinal purposes: lfts. obovate,  $\frac{3}{4}$ -1 in. long, obscurely denticulate toward apex: fls. whitish, 1 or 2 and practically sessile; calyx hairy, with subulate lobes: pod 3-6 in. long, very slender, curved, beak an in. or two long, many-seeded. S. Eu. and Asia; little grown in this country.

2. *T. cœrulea*, Ser. (*Melilotus cœrulea*, Desr.). Erect branching lightly pubescent or glabrate annual, 1-2 ft., grown for the blue-and-white fls. that are borne in long-peduncled heads: main lfts. oval,  $\frac{3}{4}$  1 in. long, denticulate, lowest ones nearly orbicular, upper ones oblong: pod not much longer than calyx but the beak long-exserted. Cent. and S. Eu.

27. TRIFOLIUM, L. CLOVER. Probably well toward 300 species of temp. regions, annual and perennial herbs, some of them important forage and cover plants; some of them are weeds.—Lvs. palmate (only rarely pinnate and not in ours) with non-articulated mostly sessile entire or denticulate lfts.; stipules adnate to petiole: fls. small, white, yellow, red, or purplish, in dense heads or spikes, papilionaceous; calyx nearly equally toothed; petals withering rather than falling off, more or less adnate to stamen-tube; stamens 9 and 1, the odd one sometimes not wholly free; style filiform, beardless, the stigma more or less oblique: fr. small, mostly indehiscent, usually 1-2-seeded, nearly or quite covered in the calyx. (Trifolium: Latin three leaves.)

Fl.-heads on long slender peduncles directly from the creeping rooting sts.; fls. white or pinkish. .... 1. *T. repens*

Fl.-heads on long or short peduncles, or even sessile, from leafy erect or ascending branching sts.

Blossoms whitish or pink (see also var. of No. 5).

Fls. soon becoming reflexed in head. .... 2. *T. hybridum*

Fls. erect. .... 3. *T. alexandrinum*

Blossoms normally red or purplish.

Heads long-spicate.

Color bright crimson or scarlet: heads single. .... 4. *T. incarnatum*

Color purple-red: heads mostly in pairs. .... 5. *T. rubens*

Heads globular or nearly so.

Peduncle of head wanting or nearly so. .... 6. *T. pratense*

Peduncle prominent. .... 7. *T. medium*

1. *T. repens*, L. WHITE CLOVER. Glabrous or glabrate creeping perennial, the sts. 6-12 in., making a flat mat: lvs. long- and slender-petioled; lfts. obcordate, minutely denticulate: heads on slender peduncles (sometimes 12 in. and more high), from the horizontal sts.; fls. white, in rather loose globular small heads, pedicelled, reflexing with age: pod about 4-seeded. Eurasia, N. Amer.—Often sown in lawns and pastures as White Dutch Clover; there are races with bronzy foliage and colored fls.; the lvs. are sometimes known as Shamrock.

2. *T. hybridum*, L. ALSIKE CLOVER. Perennial: much like No. 1 in general appearance when it becomes prostrate with age but very different: fls. pink or rose-tinted, early becoming strongly reflexed, on mostly short peduncles 2-4 in. long (but sometimes longer) that arise from the axils of upright or lopping branching sts. 1-2 ft. high that do not root at joints: lfts. ovate, not emarginate: pods 2-3-seeded. Eu.; naturalized, and an important agricultural clover.

3. *T. alexandrinum*, L. BERSEEM. EGYPTIAN CLOVER. Annual, lightly pubescent or glabrate, 1-2 ft., branched: lfts. oblong and obtuse,  $\frac{3}{4}$ -1 in. long, obscurely denticulate: fls. whitish or yellowish-white, in dense globular to oblong-ovate short-peduncled heads with bract-like involucre at base; calyx-teeth long-subulate, ciliate. Egypt, Syria; of much importance in the agriculture of Egypt, and somewhat grown in this country on dry alkaline lands.

4. *T. incarnatum*, L. CRIMSON CLOVER. Annual, persisting the winter if sown late, hairy, erect, forking, 1-3 ft.: lfts. broad-obovate to oblong-ovate, sometimes cuneate-obovate,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long, obtuse or obscurely emarginate, denticulate: fls. crimson and showy, in an oblong pedunculate spicate head 1  $\frac{1}{2}$ -2  $\frac{1}{2}$  in. long,

without involucre; calyx hairy and strong-ribbed, the lobes long-subulate. Eu., and sparingly escaped; used as cover-crop and green-manure, particularly in orchards, and sometimes grown for ornament.

5. *T. rubens*, L. Perennial, erect, glabrous, forking, 18–24 in.: lfts. narrowly long-oblong,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long and  $\frac{1}{2}$  in. broad; stipules  $1\frac{1}{2}$ –3 in. long, very acute and prominent: fls. purplish-red and showy, in spicate usually twin heads 2–3 in. long and without involucre; calyx-lobes subulate and long-ciliate. Eu., sometimes grown for ornament; there is a white-fl. race.

6. *T. pratense*, L. RED CLOVER. Short-lived hairy or glabrate perennial, 1–2 ft.: lfts. oval to oblong-oval or obovate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, minutely denticulate, obtuse or somewhat emarginate, often white-blotched; stipules 1 in. or less long, scarious, veined, with hair-like points: fls. rose-purple or magenta (varying to nearly white), in dense large ovoid sessile heads (lf. subtending it); calyx hairy, the lobes very narrow and long. Eu.; extensively naturalized and the common clover of meadows; becomes weak and tends to die out after the second year.—Var. *perenne*, Host. MAMMOTH CLOVER. Longer-lived, taller and stouter, the heads mostly darker-colored and maturing later. Var. *foliosum*, Brand. OREL CLOVER. Glabrous, very leafy, the basal lvs. long-persisting; a Russian race introduced as a hay plant.

7. *T. medium*, L. ZIGZAG or COW CLOVER. <sup>*T. medium var. flexuosum*</sup> Sts. zigzag or flexuose, nearly or quite glabrous: lfts. narrow, elliptic or oblong, entire except sometimes at base, not blotched: heads more or less stalked, the fls. deeper purple than in No. 6. Eu. and somewhat naturalized; doubtfully in cult., the agricultural plant passing under this name probably being *T. pratense* var. *perenne*.

28. *CROTALARIA*, L. RATTLE-BOX. Large cosmopolitan genus, of probably 250 species, strongly developed in Asia, annual and perennial erect herbs and shrubs, a few of them sometimes cult. for ornament mostly in Fla. and Calif.; one of them, *C. juncea*, L., yields the Sun fibre of India.—Lvs. simple (unifoliolate) or digitate with 3, 5, or 7 lfts.: fls. yellow or brownish-yellow, sometimes blue or purplish, solitary or mostly racemose, papilionaceous, often showy; standard mostly prominent and larger than the wings, the keel beaked and curved; stamens 10, connate; style strongly incurved or reflexed, somewhat bearded: fr. globose or oblong, inflated, not septate, the many seeds loose at maturity (whence *Crotalaria*: Greek *a rattle*; from the same word comes *Crotalus*, the rattlesnake).

Lvs. compound.....1. *C. capensis*

Lvs. simple.

Lf. spatulate or nearly so and very obtuse.....2. *C. retusa*

Lf. ovate or nearly so and acute.....3. *C. candicans*

1. *C. capensis*, Jacq. Branching shrub, 4–5 ft., with appressed-silky branches: lfts. 3, broadly obovate, obtuse but lightly mucronate,  $\frac{3}{4}$ –1 in. long, minutely pubescent both sides or glabrous: fls. more than 1 in. long, bright yellow and showy, many in loose racemes that are terminal or opposite the lvs: pod pubescent. S. Afr.

2. *C. retusa*, L. Annual, appressed-pubescent,  $1\frac{1}{2}$ –3 ft.: lvs. spatulate to oblanceolate, 2–3 in. long, very obtuse or even retuse, entire, gray-pubescent beneath: fls. yellow with variegated showy standard,  $\frac{3}{4}$ –1 in. long, in long terminal peduncled racemes: pod 1– $1\frac{1}{2}$  in. long, glabrous, short-beaked; seeds short kidney-shaped, mostly straw-colored. Asia and Malaya; naturalized in Fla. and trop. Amer. and elsewhere; sometimes cult. for ornament and has been offered as “yellow-flowering pea.”

3. *C. candicans*, Wight & Arn. Much-branched brown-silky shrub: lvs. ovate-oblong, 2–4 in. long, short-petioled, short-pointed, very strongly pinnate-veined, shining with silky hairs: fls. yellow, 1 in. or more across from top to bottom, the standard orbicular and slightly mucronate, silky outside; wing rugose on upper side near base: pod 1– $1\frac{1}{4}$  in. long, somewhat hairy, turgid, several-seeded. India; a handsome winter-flowering shrub in S. Fla.

29. *BAPTISIA*, Vent. FALSE INDIGO. Some two dozen erect perennial herbs in E. N. Amer., sometimes planted for ornament.—Branching, glabrous or pubescent plants, herbage usually turning black in drying: lvs. digitate (seldom simple); lfts. 3; stipules various, sometimes 0: fls. white, yellow, or



blue, in lateral and terminal racemes, papilionaceous, often showy; standard with reflexed sides, not exceeding wings; keel straight, the petals nearly separate; stamens 10, distinct; style somewhat incurved, with very small terminal stigma: fr. stalked in the calyx, short, oblong to nearly globose, inflated, many-seeded. (Baptisia: from Greek word to dye; some of the species yield an inferior indigo.)

Fls. yellow.....1. *B. tinctoria*  
Fls. blue.....2. *B. australis*

1. *B. tinctoria*, R. Br. Glabrous and somewhat glaucous, much-branched, small-leaved, 2-4 ft. high: lfts. wedge-obovate, about  $\frac{3}{4}$ -1 in. long, obtuse; peduncle short; stipules very small and caducous: fls. few in numerous racemes, bright yellow, about  $\frac{1}{2}$  in. long, on short pedicels: pod  $\frac{3}{8}$  in. or less long. Me. to Minn. and La.

2. *B. australis*, R. Br. Glabrous, somewhat branched, stout, 3-6 ft.: lfts. oblanceolate to short-spatulate, 1-2 $\frac{1}{2}$  in. long, short-pointed; peduncle short, equaled or exceeded by the lanceolate stipules: fls. indigo-blue, in long terminal erect racemes, about 1 in. long: pod oblong, 1-1 $\frac{1}{2}$  in. long. Pa. to Ga. and Tex.

30. LUPINUS, L. LUPINE. Annual and perennial herbs, sometimes subshrubs, yielding good ornamental subjects, a few of them long used for soil renovation, fodder, and for human food; the genus is specially rich in N. Amer., but extends into Eu. and Afr.; upwards of 300 species have been described.—Lvs. digitate, of 5-15 narrow lfts. (rarely 1 or 3); stipules adnate to base of petiole: fls. mostly showy, in terminal racemes or sometimes whorled, white, yellow, blue, purplish, papilionaceous; calyx 2-lipped, deeply toothed; standard erect, broad, with reflexed edges; keel incurved with the beak included; stamens monadelphous; style incurved, the terminal stigma mostly somewhat bearded: fr. flattened, mostly constricted or grooved crosswise between the seeds. (Lupinus: *lupus*, Latin for wolf, from some fancied ability of the plant to prey on the soil.)—Most of the lupines well known to cult. are annuals. There are two cultural groups of them—the large-seeded agricultural kinds and the small-seeded ornamental kinds. Aside from the lupines here treated, any of the showy native species may be transferred to grounds.

A. Plant perennial, nearly or quite glabrous: lfts. 9-16 and 2-6 in. long.... 1. *L. polyphyllus*  
AA. Plant annual, usually hairy: lfts. mostly fewer and smaller.

B. Bracts subtending pedicels persistent: fls. often yellow: pod very short, 2-seeded..... 2. *L. densiflorus*

BB. Bracts in the raceme early deciduous: pod long, several-seeded.

C. Blossoms clear yellow: fls. whorled in the raceme..... 3. *L. luteus*

CC. Blossoms not true yellow, although sometimes with yellowish spots.

D. Fls. alternate or scattered in the raceme (upper fls. in No. 9 are often scattered).

E. Seeds large,  $\frac{3}{8}$  in. or more across: agricultural species.

F. Corolla white, sometimes tinged bluish on margins.

G. Floral-bracts wanting..... 4. *L. albus*

GG. Floral bracts present (although deciduous)..... 5. *L. Termis*

FF. Corolla normally blue, sometimes tinged white..... 6. *L. hirsutus*

EE. Seeds small, about  $\frac{1}{8}$  in. across.

F. Stature 2 ft. and more: very hairy..... 7. *L. Hartwegii*

FF. Stature 1 ft. or less: pubescent..... 8. *L. subcarnosus*

DD. Fls. whorled, so that the raceme is interrupted (upper fls. in Nos. 6 and 7 are often whorled).

E. Corolla blue or white but with yellow mark on standard.... 9. *L. mutabilis*

EE. Corolla blue or white without yellow spots or marks.

F. Stature low: plant forming compact clump, with linear lfts. 10. *L. nanus*

FF. Stature ordinary, the plant not forming tuft or cushion, and lfts. broader.

G. Sts. succulent, nearly glabrous..... 11. *L. affinis*

GG. Sts. not succulent, manifestly pubescent..... 12. *L. pubescens*

1. *L. polyphyllus*, Lindl. Perennial, stout and erect, 3-5 ft., glabrate, or sparsely hairy-pubescent above: lvs. very long-stalked, the petioles 6-12 in. long or the upper ones shorter; lfts. 9-16, lanceolate to oblanceolate, 2-6 in. long, acute, glabrous above and sparsely hairy beneath; stipules pointed, adnate to petiole for

one-third or one-half their length: fls. with purplish standard, blue wings and mostly dark-tipped point of keel, about  $\frac{1}{2}$  in. long, many and alternate on slender pedicels in a rather dense terminal raceme 1-2 ft. long: pod 1-1 $\frac{1}{2}$  in. long, woolly-hairy; seeds about 6, oblong,  $\frac{1}{8}$ - $\frac{1}{4}$  in. long, brown-black and glossy. Calif. to Wash.—There are white-fl. races (var. *albiflorus*), as also blue-and-white (var. *bicolor*). Var. *Moerheimii*, Hort., is a compact form with fls. in different colors. *L. roseus*, Hort., is a rose-colored race.

2. *L. densiflorus*, Benth. (*L. Menziesii*, Agardh. *L. sulphureus*, Hort., not Dougl.). Hairy stout annual, 1 $\frac{1}{2}$  2 ft., sts. branching mostly at the middle: lfts. 7 10, oblong-lanceolate, 1-2 in. long, acute and mucronate, hairy: fls. white, yellow, sometimes rose,  $\frac{1}{2}$   $\frac{5}{8}$  in. long, in dense whorls on a long-peduncled raceme 6 10 in. long, calyx pubescent; bracts persistent, little exceeding pedicels: pods ovoid,  $\frac{3}{4}$  in. or less long, hairy, 2-seeded; seeds about  $\frac{1}{4}$  in. across, compressed, whitish. Calif.

3. *L. luteus*, L. YELLOW LUPINE. Annual, making many lvs. from the base, st. nearly simple, erect, hairy, 1-2 ft.: lfts. 7-11, linear-lanceolate, oblong to somewhat oblanceolate or the lower ones narrow-obovate, 1-1 $\frac{1}{2}$  in. long, short-acute, hirsute: fls. yellow and fragrant,  $\frac{3}{4}$  in. long, whorled in long terminal racemes, usually standing well above the foliage, nearly sessile; upper lip of calyx 2-parted, lower 3-toothed: pod oblong, flat, hairy; seeds large, dull light gray, with brown markings. S. Eu.; an old fodder plant and soil renovator; also useful for ornament.

4. *L. albus*, L. WHITE LUPINE. Annual, erect, hairy, 1 $\frac{1}{2}$ -4 ft., branching: lfts. 5-7, obovate-oblong, 1-2 in. long, very short-acute, ciliate on margins, appressed-hairy beneath but becoming glabrous above: fls. white (or somewhat tinted),  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, alternate in short nearly sessile terminal racemes; calyx without bracts at base, upper lip entire: pod 2 $\frac{1}{4}$ -4 in. long and  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, stout-beaked, hairy; seeds whitish, nearly orbicular, compressed,  $\frac{1}{3}$  in. across. Levant.—Anciently and still cult. for land improvement, fodder and human food, but little known in Amer.

5. *L. Termis*, Forsk. EGYPTIAN LUPINE. Very like *L. albus*, but calyx subtended with deciduous bracts: fls. white with usually bluish tint on apex of standard and bluish-green on apex of keel: silky-villous annual to 4-5 ft. Levant; cult. same as No. 4, and introduced into U. S. for dry regions; Termis is the Arabic name of the plant.

6. *L. hirsutus*, L. BLUE LUPINE. Strongly brown-hairy annual, often very low but rising 2 ft. or more: lfts. 5-7, oblanceolate to oblong-obovate, 1-1 $\frac{1}{2}$  in. long; stipules prominent, very narrow: fls. blue usually with white-tipped keel,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, alternate or the upper ones more or less whorled in a terminal raceme, short-pedicelled; calyx silky-hairy, with short lobes: pod large, very hairy; seeds oblong-reniform,  $\frac{1}{2}$  in. long, rough, gray or brownish. S. Eu.; an old agricultural large-seeded species; also grown for ornament, with races bearing white and reddish fls.—*L. pilosus*, L., is similar, but the lfts. 9-11 and calyx-lobes long-narrow. Levant.

7. *L. Hartwegii*, Lindl. Stout erect shaggy-hairy annual, 2-3 ft., very leafy, little branched: lfts. 7-10, narrow-oblong to oblong-lanceolate, 2-3 in. long, obtuse but with a short mucro, very hairy; petioles commonly much exceeding lfts.; stipules with very long slender points: fls. blue in general but the parts of the corolla differently colored, the standard typically rose-colored in center, about  $\frac{1}{2}$  in. long, mostly alternate (sometimes obscurely whorled) in a long terminal raceme in which the shaggy bracts are very long and prominent before the fls. open; calyx hairy, with long slender lobes: pod 1-1 $\frac{1}{4}$  in. long, hairy; seeds white and glossy, about  $\frac{1}{8}$  in. long. Mex.; named after Theodor Hartweg, collector in Mex. for the Horticultural Society of London; color races appear in cult.

8. *L. subcarnosus*, Hook. (*L. texensis*, Hook.). Small annual, usually a foot or less high, silky-pubescent: lfts. 5, oblanceolate to narrowly oblong-obovate,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, short-acute, obtuse or even retuse at apex, nearly or quite glabrous above and lightly hairy beneath; petiole exceeding the lfts.; stipules narrow and long-pointed: fls. blue with white or yellowish spot in center of standard, about  $\frac{1}{2}$  in. long, scattered in a short terminal raceme; calyx hairy, with upper lip much shorter: pod about 1 $\frac{1}{2}$  in. long, hairy; seeds  $\frac{1}{8}$ - $\frac{1}{4}$  in. across, mottled. Tex.

9. *L. mutabilis*, Sweet. Stout glabrous showy annual, sts. becoming somewhat woody at base, 3 6 ft. high: lfts. 7-11, lanceolate to oblong to broad-oblanceolate, 2-3 in. long, obtuse, glabrous and gray-green; stipules very small, sometimes rudimentary: fls. white but with yellow and sometimes violet on the standard, about  $\frac{3}{4}$  in. long, prominently pedicelled in a long terminal raceme, the lower ones whorled

and the upper ones often or usually alternate; calyx glabrous, the narrow long lips of similar length or the lower somewhat longer: pod 2-3 in. long and  $\frac{3}{4}$  in. broad, pubescent; seeds white (sometimes mottled brown), smooth and flat,  $\frac{1}{2}$  in. long. Mts. in S. Amer., but apparently unknown native.—In cult. the colors are modified, becoming rose or purplish, sometimes differing between bottom and top of raceme. Amongst the other garden lupines, these races are distinguished by the flat white rather large seeds and glabrous herbage. Var. *Cruckshanksii*, Voss (*L. Cruckshanksii*, Hook.). Fls. bluish shaded with violet and purple. Peru, where it was collected by Alexander Cruckshanks.

10. *L. nanus*, Dougl. Slender annual 6-15 in. high, branching from base, finely pubescent or somewhat hairy: lfts. 5-8, linear or narrowly oblanceolate,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. or sometimes more long, acute and mostly mucronate, pubescent at least beneath, margins ciliate; petioles exceeding lfts.; stipules very small: fls. blue and fragrant, standard with purple-dotted white spot, usually  $\frac{1}{2}$  in. or less long, in more or less distinct whorls in short terminal racemes; calyx hairy, the lobes long: pod about  $\frac{3}{4}$  in. long, hairy; seeds white, flat,  $\frac{1}{2}$  in. or more long. Calif.; in cult. running into color races.

11. *L. affinis*, Agardh. Stout and succulent annual, the sts. often markedly hollow, nearly glabrous, 1-2 ft., branching mostly at the middle: lfts. 6-8, oblong-oblanceolate to broadly wedge-obovate, 1-2 in. long, obtuse or retuse, equaling or shorter than the petiole, sparsely pubescent underneath; stipules small and setaceous: fls. deep bluish-purple, about  $\frac{1}{2}$  in. long, short-peduncled, whorled in rather short racemes; upper lip of calyx 2-toothed, lower lip mostly entire: pod about 1 in. long, pubescent or glabrate. Calif.; a winter annual, blooming in spring.

12. *L. pubescens*, Benth. Much-branched soft-pubescent annual,  $1\frac{1}{2}$ -3 ft.: lfts. 7-9, oblanceolate, 1-2 in. long, mostly obtuse but mucronate (rarely retuse), pubescent on both sides, margins ciliate; petiole usually exceeding lfts.; stipules very small or nearly rudimentary: fls. violet-blue with white center, becoming purple-red, about  $\frac{1}{2}$  in. long, whorled in long terminal racemes; calyx-lips entire: pod about 1 in. long, very hairy; seeds 4-6, oblong-reniform or angled, white but more or less marked or marbled, glossy,  $\frac{1}{8}$ - $\frac{1}{4}$  in. long. Mex. and Guatemala.—Long in cult. and probably the source of most of the hairy annual lupines of flower-gardens, in many colors and combinations. These garden plants are sometimes known as *L. hybridus*, Voss, and very likely there is hybridity in them. To the group as a whole belong garden names *L. albococcineus*, *californicus*, *Dunnettii*, *elegans*, *guatemalensis*, *insignis*, *Moritzianus*, *speciosus*, *superbus*, *tricolor*, *venustus*. These plants are at once distinguished from the *L. hirsutus* group by the absence of brown-shaggy hairiness and the small seeds.

31. **ERYTHRINA, L. CORAL-TREE.** Mostly woody plants, but sometimes with herbaceous top, bearing showy fls., grown for ornament within our territory; species probably 50 or so in warm temp. and trop. regions around the world.—Plants mostly spiny: lvs. alternate, with 3 broad lfts., and glanduliform stipels: fls. usually large and bright colored, mostly scarlet, fascicled or in pairs in dense racemes, papilionaceous or nearly so, soon falling; calyx mostly oblique or 2-lipped, sometimes more or less equally 5-toothed, sometimes splitting to base; standard broad or narrow, sometimes on a long stalk-like base; wings frequently wanting; stamens either monadelphous or diadelphous (9 and 1); style incurved and beardless, the stigma small and terminal: fr. a long stipitate 2-valved pod constricted between the seeds, the latter often highly colored. (*Erythrina*: Greek *red*, from the color of the fls.)—Some of the arborescent species are grown in coffee and cocoa plantations to provide the requisite shade, often under the name "immortelles"; the fls. appear mostly when the plant is not in fl. Within the U. S. the erythrinas are somewhat grown far S. for the brilliant fls., one species (No. 1) more or less under glass.

Fls. opening wide—the standard erect at full anthesis, usually very broad, standing at right angles to direction of wings and keel.

Petioles strongly armed: calyx nearly truncate at full anthesis. . . 1. *E. Cristagalli*

Petioles usually unarmed: calyx strongly oblique, splitting to base on back. . . . . 2. *E. indica*

Fls. closed in full anthesis—the standard in the same plane as wings and keel, and covering them.

Sts. annual (herbaceous): fls. narrow, the standard when folded together usually  $\frac{1}{4}$  in. or less broad. . . . . 3. *E. herbacea*

Sts. persistent (woody): standard when folded  $\frac{1}{4}$  in. or more broad.

Petiole glabrous, usually armed: stipels not prominent: calyx truncate, teeth not evident. . . . . 4. *E. Corallodendrum*

Petiole more or less puberulous, unarmed: gland-form stipels large: calyx obliquely 2-labiate or splitting, the teeth usually evident. . . . . 5. *E. caffra*

1. *E. Cristagalli*, L. COCKSPUR CORAL-TREE. Shrub or small tree, the flowering branches dying back after blooming and strong ones arising from the root or stock: sts. with flat strong spines; petioles and sometimes the midribs stoutly armed: lfts. ovate-oblong to oblong-lanceolate, 4-6 in. long, or on the upper lvs. oval and smaller, firm in texture, entire, short-acute or mucous, glabrous: fls. brilliant crimson, about 2 in. long, the broad standard open and erect at full anthesis but at other times closed down over the shorter keel and still shorter rounded wings; calyx short and nearly truncate. Brazil.—Apparently the commonest species in cult. in the U. S., sometimes under glass and also planted out for the summer. Sometimes known erroneously as *E. speciosa*.

2. *E. indica*, Lam. Large tree, sometimes with small black prickles but usually unarmed: lfts. broad-ovate to rhombic-ovate, short-pointed or the terminal one cuspidate, 4-6 in. long and as broad, entire, rather thin, glabrous: fls. scarlet, large and showy, in dense racemes, 2-3 in. long; calyx spathe-like, oblique and not 2-lipped, splitting on the back down to the base; standard ovate or oval, standing erect or nearly so, the keel and wings shorter than calyx; stamens standing alone and prominent: pod 6-12 in. long, thick; seeds  $\frac{3}{8}$ - $\frac{1}{4}$  in. long, turgid, bean-like. India, Malaya.—Planted in trop. Amer., but known in U. S. mostly in var. *picta*, Hort. (*E. picta*, L.), a kind with spotted or variegated lvs., known in the races *E. Parcellii* and *E. marmorata* of the trade; usually glasshouse subjects.

3. *E. herbacea*, L. Top herbaceous, the sts. 2-4 ft. high, slender, erect or spreading, the flowering ones with few lvs.: lvs. usually prickly on petiole and rachis; lfts. deltoid to hastate to angled-ovate, 2-3 $\frac{1}{2}$  in. long, all of them or at least the middle one angle-lobed with a long point, thin, glabrous: fls. rather small, 2 in. or less long and narrow, nearly or quite closed, scarlet, few in each raceme which is 1-2 ft. long; calyx narrow, truncate, ciliate; standard infolding the much shorter remaining petals; wings slightly longer than calyx and exceeding the keel: pod 3-5 in. long, short-beaked; seeds bright scarlet with black spot. N. C. to Fla. and Tex.; sometimes planted.—A closely related plant is *E. arborea*, Small (*E. herbacea* var. *arborea*, Chapm.), in S. Fla., a shrub or tree attaining to 25-30 ft., with persistent sts. and racemes commonly only 4-8 in. long and few-fl.

4. *E. Corallodendrum*, L. Small tree, 15-20 ft., usually spiny or prickly but sometimes unarmed: lfts. broadly rhombic-ovate, 2-5 in. long, the middle one often angle-lobed and with a long point, rather thin, glabrous, sometimes with spines on the ribs as also on petioles: fls. brilliant deep crimson, 2 or 3 together in loose racemes, standing at right angles or deflexed, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, but mostly under 2 in., narrow and nearly or quite closed; calyx open and truncate but with a sharp process or tooth on the under edge, little inflated and less than  $\frac{1}{2}$  in. long; standard closed down over the keel which is only one-fourth as long; wings not much exceeding calyx and keel: pod about 4 in. long, beaked; seeds scarlet, usually with black spot. Trop. Amer.—A tree commonly confused with this in trop. Amer. has recently been separated as *E. pallida*, Britt. & Rose: fls. pale or salmon-red, 2 $\frac{1}{2}$ -3 in. long, calyx loose or inflated and much wider than the corolla and more than  $\frac{1}{2}$  in. long.

5. *E. caffra*, Thunb. Good-sized tree, 30-40 or even 60 ft., with small prickles: lvs. with unarmed mostly puberulous petioles, clustered toward end of shoots; lfts. broad-ovate, obtusely acuminate, glabrous, 2-2 $\frac{1}{2}$  in. long and 1 $\frac{1}{2}$ -2 in. broad, abruptly tapering to a blunt point-like apex, the glanduliform stipels conspicuous: fls. brilliant scarlet, many in dense racemes; calyx obliquely lipped or splitting, usually manifestly 5-toothed; standard 1 $\frac{1}{2}$ -2 in. long, folded downward over the wings and keel, which are very minute and concealed. S. Afr.

32. AMORPHA, L. FALSE INDIGO. Ten to 15 closely related species in N. Amer. south to Mex., sometimes grown in the open for ornament.—Shrubs or subshrubs, glabrous or hairy, glandular-punctate: lvs. alternate, odd-pinnate, deciduous, with small entire lfts.: fls. small, not papilionaceous, dark to blue-violet or whitish, in dense terminal spikes which are often clustered; calyx campanulate, with 5 nearly equal teeth or the lower ones longer; corolla



with wings and keel lacking, the standard folded around the stamens, these monadelphous at base, exserted: fr. short, indehiscent, slightly curved, with 1-2 seeds. (Amorpha: Greek *deformed*, the fls. destitute of wings and keel.)

Lowest pair of lfts. close to the st.: plant grayish- or whitish-pubescent....1. *A. canescens*  
 Lowest pair of lfts. remote from the st.: plant glabrous or nearly so,  
 rarely yellowish-pubescent.....2. *A. fruticosa*

1. *A. canescens*, Nutt. LEAD-PLANT. Low shrub 1-4 ft. high, more or less densely white-hairy: lvs. 2-4 in. long; lfts. 21-49, nearly sessile, oval or ovate-lanceolate, acutish or apiculate, about  $\frac{1}{3}$ - $\frac{1}{2}$  in. long; fls. blue, the spikes crowded into terminal panicles: pod tomentose. June. Man. to La. and New Mex.—Used in rockeries and borders of shrubberies.

2. *A. fruticosa*, L. (*A. fragrans*, Sweet). BASTARD INDIGO. Ornamental shrub 5-20 ft. high, with fine feathery foliage: lvs. 6-10 in. long; lfts. 11-21, oval or elliptic,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, mostly obtuse and mucronulate: spikes dense, 3-6 in. long, usually panicle; fls. dark purple: pods stout, glandular. Sask. to Fla. and Mex.—Remarkable for the unusual color of its dark violet-purplish fls. Very variable, there being white-fl. and pale blue-fl. vars., while still another is covered with yellowish-brown pubescence.

33. CARAGANA, Lam. PEA-TREE. Shrubs or sometimes small trees grown for ornament and hedges; more than 50 species from S. Russia to China, most of them in Cent. Asia.—Deciduous, spiny or unarmed: lvs. even-pinnate, mostly with a persistent spine or bristle at tip of rachis; lfts. small, entire; stipules deciduous or persistent and spinose: fls. papilionaceous; standard upright, with long claws like the wings; keel obtuse and straight; stamens 9 and 1; ovary scarcely stipitate: fr. linear, terete, straight, 2-valved, with several seeds. (Caraga-na: *Caragan*, its Mongolian name.)—In some species the rachis remains after the lfts. fall, developing into a slender woody spine which persists for years. The stipules, also, are often represented by a pair of spines. The spines of the wild state, however, often become mere bristles under cult.

Lfts. 2-4.

Plant unarmed in cult.: lfts. all attached near end of rachis.....1. *C. frutex*

Plant with persistent spiny stipules: only the larger pair of lfts.

attached near end of rachis.....2. *C. Chamlagu*

Lfts. more numerous.

Shrub or small tree 15-20 ft. high: lfts.  $\frac{1}{2}$ - $\frac{5}{8}$  in. long: fr.  $1\frac{1}{2}$ -2 in.

long.....3. *C. arborescens*

Shrub 6-10 ft. high: lfts.  $\frac{1}{8}$ - $\frac{1}{2}$  in. long: fr.  $1\frac{1}{4}$  in. long.....4. *C. microphylla*

1. *C. frutex*, Koch (*C. frutescens*, DC.). Glabrous unarmed shrub to 10 ft. high, with long erect branches not much divided except near the ends: lvs. with 2 pairs of lfts., these stalkless and attached near the end of the common rachis, obovate, rounded at the tip,  $\frac{1}{2}$ -1 in. long or more, dull green: fls. bright yellow,  $\frac{3}{4}$ -1 in. long, produced singly on a somewhat shorter pedicel; calyx  $\frac{1}{2}$  in. long, bell-shaped: fr.  $1\frac{1}{2}$  in. long,  $\frac{1}{8}$  in. wide. Spring. S. Russia to Japan.—A var. has larger fls.

2. *C. Chamlagu*, Lam. Rounded bushy shrub to 4 ft. high, with angular branches: lvs. with 2 unequal pairs of obovate lfts. variable in size, the terminal pair the larger; rachis spine-tipped, persisting after the lfts. have fallen, but not developing into a formidable thorn; stipules  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, becoming stiff thorns: fls. reddish-yellow,  $1\frac{1}{4}$  in. long, solitary on a slender stalk  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; calyx bell-shaped, nearly  $\frac{1}{2}$  in. long, with 5 short triangular teeth: fr.  $1\frac{1}{2}$  in. long, slender. Spring. (Chamlagu: vernacular name.) N. China.—The bruised bark smells like licorice.

3. *C. arborescens*, Lam. Shrub or small tree to 20 ft. high, rather erect, sometimes of almost fastigiate habit; bark on young branchlets slightly winged: lvs.  $1\frac{1}{2}$ -3 in. long, usually of 4-6 pairs of oval or obovate lfts.  $\frac{1}{3}$ - $\frac{5}{8}$  in. long; rachis tipped with a bristle-like spine; stipules linear, spine-tipped, finally developing into a pair of stiff spines  $\frac{1}{4}$  in. long, or these lacking in cult.: fls.  $\frac{5}{8}$ - $\frac{7}{8}$  in. long, yellow, borne singly on slender downy pedicels  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, several from each of the enlarged scaly buds on the previous year's wood; calyx  $\frac{1}{4}$  in. long, helmet-shaped, 5-toothed, with hairy margins; standard curled backward at the sides: fr.  $1\frac{1}{2}$ -2 in. long, on a slender stalk about as long. Spring and early summer. Siberia, Manchuria.—A var. with pendulous branches is offered, also one with narrow lfts. about 1 in. long.

4. *C. microphylla*, Lam. (*C. arborescens* var. *arenaria*, Hort.). Shrub 6-10 ft. high, wider than high, with light gray young bark, the long slender branches little divided and ultimately more or less pendent: lvs.  $1\frac{1}{2}$ -3 in. long, of 6-9 pairs of lfts.; rachis ending in a short spine but not persistent; stipules spiny,  $\frac{1}{2}$  in. long; lfts.  $\frac{1}{8}$ - $\frac{1}{4}$  in. long, oval or obovate, dull grayish-green, silky-hairy at first, becoming glabrate: fls. yellow,  $\frac{3}{4}$  in. long, solitary, the pedicels rather shorter; calyx  $\frac{1}{2}$  in. long, cylindric, with short pointed teeth: fr. about  $1\frac{1}{4}$  in. long,  $\frac{1}{2}$  in. wide, compressed. Spring and early summer. Siberia, China.

34. **SESBANIA**, Scop. Herbs or shrubs, or sometimes arborescent, grown in the warm- or cool-house, and used for outdoor planting in the far S.; over 20 species, widely distributed in the warmer regions of both hemispheres.—Lvs. abruptly pinnate; lfts. many-paired, entire; stipels minute or none: racemes axillary, lax; fls. papilionaceous, yellow, red-purple, variegated or white, slender-pedicelled; calyx broad, truncate, toothed or subequally lobed; standard roundish or ovate, spreading or reflexed; wings falcate-oblong; keel incurved, obtuse or obtusely acuminate, with long claws; stamens 9 and 1, free from the standard; ovary often stipitate: fr. linear or rarely oblong, compressed, 4-angled or 4-winged, with transverse partitions between the seeds, 2-valved or sometimes scarcely opening. (*Sesbania*: from *Sesban*, the Arabian name of *S. ægyptiaca*; the generic name is sometimes written *Sesban*, but the Latinized form is here used.)—A single native species, *S. macrocarpa*, Muhl., annual, with yellow purplish-spotted fls. about  $\frac{3}{4}$  in. long, is found in wet or moist soil from S. C. and Fla. west to Mo., Tex., Ariz., and Calif. where it is said to be grown as a cover-crop. It extends southward to Cent. Amer.

*S. grandiflora*, Poir. (*Agati grandiflora*, Desv.). A short-lived soft-wooded tree 20-30 ft. high: lvs. 6-12 in. long; lfts. 40-60, linear-oblong, pale green, glaucous: fls. 2-4 in short axillary racemes, rose-red, white, or rusty red,  $2\frac{1}{2}$ -4 in. long and showy; calyx campanulate, undulate-dentate, nearly  $\frac{3}{4}$  in. long; standard oval-oblong: fr. pendulous, 1 ft. long or more, compressed, falcate, slightly torulose, with swollen margins; seeds separated by ingrowths from the walls. Late summer. Mauritius, India to N. Australia.

35. **ROBINIA**, L. Locust. Perhaps 15 species in N. and Cent. Amer., several of which are planted for ornament.—Deciduous trees or shrubs, usually spreading freely from underground parts; branches without terminal bud: lvs. alternate, odd-pinnate, with small often spinose stipules; lfts. stalked, entire, stipellate: fls. papilionaceous, slender-pedicelled, in axillary usually pendulous or nodding racemes; calyx campanulate, 5-toothed, slightly 2-lipped; petals short-clawed; standard large, rounded, scarcely longer than the wings and keel; stamens 9 and 1: fr. oblong to linear, flat, several-seeded, dehiscent. (*Robinia*: after Jean and Vespasian Robin, herbalists to the king of France in the 16th and 17th centuries.)

Fls. white (light pink in one var.): branchlets glabrous or slightly

pubescent: pod smooth.....

Fls. pink or purple: pods hispid.....1. *R. PseudoAcacia*

Peduncles and branchlets bristly-hispid or the latter sometimes

glabrous: lfts. usually less than 15.....2. *R. hispida*

Peduncles and branchlets viscid: lfts. usually more than 15.....3. *R. viscosa*

1. *R. PseudoAcacia*, L. FALSE ACACIA. BLACK ACACIA. YELLOW LOCUST. Nearly glabrous tree to 80 ft., with deeply furrowed dark brown bark and prickly branches: lfts. 7-19, oval or elliptic, 1-2 in. long, rounded or truncate and mucronate at apex: fls. white, very fragrant, about  $\frac{3}{4}$  in. long, in pendulous puberulous racemes 4-5 in. long: fr. linear-oblong, reddish-brown, 3-4 in. long. Spring and early summer; fr. late summer and autumn remaining on the branches during the winter. (*PseudoAcacia*: false *Acacia*.) Pa. to Ga. west to Ia., Mo. and Okla., often naturalized elsewhere.—Many vars. are in cult., with unarmed or more or less pendulous branches, or some with foliage yellow or purple. One var. has light rose-colored fls.

2. *R. hispida*, L. ROSE ACACIA. Branching shrub 1-3 ft. or rarely higher; sts., branchlets, peduncles, and often the petioles bristly-hispid: lfts. 7-13, suborbicular to oval,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, obtuse and mucronate, glabrous or nearly so: fls. rose-colored or pale purple, 1 in. long, in short 3-5-fld. racemes: pod densely hispid, few-seeded. Late spring and early summer. Va. to E. Tenn., Ga. and Ala.

3. *R. viscosa*, Vent. Tree to 40 ft., the dark reddish-brown branchlets and usually the petioles and peduncles densely glandular-viscid: stipules sometimes spiny; lfts. 13-25, ovate to oblong, 1 $\frac{1}{2}$ -2 in. long, obtuse or acute, mostly rounded at base, pubescent beneath or sometimes glabrous: fls.  $\frac{3}{4}$  in. long, pink, in 6-15-fld., dense, rather upright racemes; standard with a yellow blotch: fr. linear-oblong, glandular-hispid, 2-3 $\frac{1}{2}$  in. long. Late spring and early summer. N. and S. C. to Ala.; naturalized elsewhere.

36. *GLIRICIDIA*, HBK. Woody plants, differing from Robinia in having wingless or marginless pods and coriaceous valves; probably 6-8 species, Cuba and Mex. to S. Amer.—Lvs. odd-pinnate, the lfts. entire: fls. papilionaceous, rose-colored, racemose or fascicled; calyx campanulate, entire or obscurely toothed; standard large, reflexed; wings falcate-oblong; keel incurved, obtuse; ovary stipitate, many-ovuled, becoming a broad-linear 2-valved pod. (*Gliricidia*: Latin *rodent poison*, from the seeds.)

*G. sepium*, Steud. (*G. maculata*, Steud.). A small tree to 20 ft. high, reported as cult. in S. Fla.: lfts. about 17, oblong-ovate, acute or obtusish, somewhat appressed-pubescent: fls. pink and white, blooming profusely in spring often after the lvs. drop: pod linear, compressed, with slightly thickened margin; seeds 3-6. Cent. Amer. and Colombia.

37. *CLADRASTIS*, Raf. YELLOW-WOOD. Four species of deciduous trees in N. Amer. and E. Asia (if *Maaackia* is separated).—Winter-buds naked, several superposed and concealed during the summer in the enlarged base of the petiole: lvs. alternate, odd-pinnate, with few rather large entire short-stalked lfts.: fls. papilionaceous, white, in long usually paniced racemes; calyx campanulate, 5-toothed; stamens 10, distinct or nearly so: fr. narrow-oblong, compressed, 3-6-seeded, with thin membranaceous valves. (*Cladrastis*: Greek *brittle branch*.)

*C. lutea*, Koch (*C. tinctoria*, Raf. *Virgilia lutea*, Michx.). A beautiful flowering native tree with graceful head and short trunk and with yellow wood and smooth bark, sometimes 50 ft. high: lfts. 7-9, oval or ovate, 3-4 in. long, glabrous, bright green, turning bright yellow in autumn: panicles many-fld., loose, drooping, 10-20 in. long; fls. white, fragrant, over 1 in. long: fr. short-stalked, glabrous, 2-4 in. long, 2-6-seeded. Summer. Mo., Ky., Tenn., N. C. and Ala.

38. *SOPHORA*, L. About 25 species of ornamental woody or rarely herbaceous plants, native in the temp. and subtemp. regions of both hemispheres.—Deciduous or evergreen: lvs. alternate, odd-pinnate with opposite, entire, usually small lfts.: fls. pea-like, in terminal racemes or panicles; calyx with 5 short teeth; standard orbicular or broadly ovate; stamens 10, distinct or nearly so: fr. stalked, almost terete or 4-winged, rarely compressed, few- to many-seeded, moniliform, indehiscent, or tardily dehiscent. (*Sophora*: *Sophora*, Arabian name of a tree with pea-shaped fls.)

Lfts.  $\frac{1}{2}$  in. long or less: spinescent shrub.....1. *S. viciifolia*  
Lfts. larger: unarmed trees.....2. *S. japonica*

1. *S. viciifolia*, Hance. Deciduous more or less spiny shrub to 6 ft., with slender spreading pubescent branchlets: lvs. 1 1 $\frac{1}{2}$  in. long, short-petioled; lfts. 11-15, sessile, elliptic,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, obtuse and mucronulate, pubescent beneath: fls. bluish-violet or nearly white, about  $\frac{1}{2}$  in. long, in short 6-12-fld. racemes terminating short branchlets; calyx violet, shortly 5-toothed; petals of nearly equal length; standard spatulate-obovate, reflexed; pod about 2 in. long, slender, long-beaked, glabrous. Summer. Cent. and W. China.

2. *S. japonica*, L. JAPANESE PAGODA-TREE. Round-headed deciduous tree attaining 60 ft., with spreading branches: lvs. 7-9 in. long; lfts. 7-17, distinctly

stalked, ovate to ovate-lanceolate, 1-2 in. long, acute, rounded at base, dark green and glossy above, more or less pubescent beneath: fls. yellowish-white,  $\frac{1}{2}$  in. long, in loose panicles 15 in. long: fr. distinctly stalked, glabrous, 2-3 in. long,  $\frac{1}{2}$  in. broad. Late summer and autumn. China.—A var. has long slender pendulous branches.

39. **CLIANTHUS**, Soland. Half-trailing shrubs grown in the greenhouse or out-of-doors in the S.; 2 or 3 species from Australia and New Zeal.—Lvs. unequally pinnate, with many entire lfts.: fls. papilionaceous, very large, red, pendulous, in axillary racemes, the sharply acuminate curved and beak-like keel prolonged beyond the wings and standard; stamens 9 and 1: fr. stalked, many-seeded. (Cliau-thus: Greek *glory-flower*.)

Plant hoary with long silky hairs: fls. 4-6 in a raceme.....1. *C. Dampieri*  
Plant glabrous or nearly so: fls. 8 or more in a raceme.....2. *C. puniceus*

1. **C. Dampieri**, A. Cunn. GLORY PEA. Plant 2-4 ft. high, grayish-green, the st. clothed with long white hairs and slightly reddish-tinged: lvs. odd-pinnate, the many lfts. opposite or sometimes alternate, sessile, oblong or elliptic, usually acute: fl.-stalk upright, shorter than the lvs., with 4-6 fls. clustered near the tip; fls. about 3 in. long, bright scarlet, with a large velvety purple-black area on the lower half of the erect standard: fr. leathery, silky-hairy, glabrous within. (Named for W. Dampier, 1652-1715, an English traveler and writer who discovered this plant.) Australia.—Hort. vars. are offered with petals differing in color.

2. **C. puniceus**, Banks & Soland. PARROTS-BILL. RED KOWHAI. Shrubby, much-branched, 3-6 ft. high, glabrous or nearly so: lfts. shortly stalked, the lower opposite, the upper alternate, blunt or slightly notched: fls. at least 3 in. long, in short axillary clusters of about 8 each, crimson fading in age, the standard slightly white-striped near center: fr. somewhat leathery, hairy within. New Zeal.—There are vars. with white or bright scarlet fls.

40. **COLUTEA**, L. BLADDER SENNA. About a dozen species of ornamental shrubs from the Medit. region to Abyssinia and the Himalayas.—Deciduous, with alternate odd-pinnate lvs.: lfts. many, rather small; stipules small: fls. papilionaceous, yellow or brownish-red, rather large, in axillary, long-peduncled, few-fl. racemes; calyx campanulate, 5-toothed; standard suborbicular, with 2 folds or swellings above the claw; stamens 9 and 1: fr. inflated and bladder-like, many-seeded. (Colu-tea: ancient Greek name.)

**C. arborescens**, L. To 15 ft. high: lfts. 9-13, dull green, usually pubescent beneath, elliptic, obtuse and mucronulate or emarginate,  $\frac{1}{2}$  1 in. long: fls. yellow, about  $\frac{3}{4}$  in. long, 3-8 in a raceme; wings nearly as long as the keel, flat: fr.  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, tipped by the persistent style. Summer and autumn. S. Eu., N. Afr.—There are dwarf vars. with crisped or bullate lvs.

41. **SWAINSONA**, Salisb. An Australian genus of about 30 species of herbs or subshrubs, grown in greenhouses or in the extreme S. out-of-doors.—Plants glabrous or subappressed-pilose: lvs. odd-pinnate; lfts. many, without stipels; stipules frequently herbaceous with broad base, rarely bristle-like: fls. papilionaceous, blue-violet, purple, red, rarely white or yellowish, in axillary usually peduncled many-fl. racemes; calyx of 5 subequal teeth, or the 2 upper grown together; standard orbicular or reniform, spreading or reflexed; wings oblong, falcate or somewhat twisted; keel broad, incurved, obtuse; stamens 9 and 1; ovary sessile or stipitate, many-ovuled: fr. ovoid or oblong, turgid or inflated, coriaceous or membranaceous. (Swainso-na: named for Isaac Swainson, an English horticulturist, died 1806.)—Differs from *Colutea* chiefly in the smaller stature and the large lateral stigma.

**S. galegifolia**, R. Br. (*Vicia galegifolia*, Andr. *Colutea galegifolia*, Sims.). Glabrous erect branching shrub 3-4 ft. high; branches long, flexuous or half-climbing: lfts. in 5-10 pairs with an odd terminal one,  $\frac{1}{2}$ -1 in. long, oblong, obtuse or somewhat emarginate: racemes axillary, mostly exceeding the lvs., bearing deep red fls. about  $\frac{3}{4}$  in. long: pod 1-2 in. long, much inflated, stipitate. Almost con-



tinuous bloomer. Australia.—Vars. with white and rose-violet or pink fls. are not uncommon. Sometimes grown as "winter sweet pea," although not fragrant.

42. **ANTHYLLIS**, L. Perennial herbs, or sometimes subshrubs, a few planted for ornament and one also for forage; about 20 species in Eu., N. Afr. and Asia.—Lvs. odd-pinnate; heads axillary or 2-3 apparently terminal at the tips of the branches; fls. pea-like; calyx-tube inflated near base, the limb toothed or lobed; petals long-clawed, the 4 lower mostly united with the stamen-tube; stamens coalescent into a tube, the upper often becoming distinct at fruiting; fr. usually ovoid. (*Anthyllis*: Greek meaning *downy fls.*)

Plant 3-8 or even 12 ft. high: lvs. densely silky-hairy.....1. *A. Barba-Jovis*  
Plant not over 1 ft. high: lvs. not densely silky-hairy.....2. *A. Vulneraria*

1. **A. Barba-Jovis**, L. JUPITERS BEARD. Silky-hairy evergreen, 3-8 or even 12 ft. high; branchlets very leafy: lvs. hardly stalked, with many oblong, apiculate lfts.  $\frac{1}{2}$ - $\frac{3}{4}$ in. long; fls. straw-colored or whitish, in clover-like heads about  $\frac{3}{4}$ in. across. S. Eu.

2. **A. Vulneraria**, L. KIDNEY VETCH. WOUNDWORT. Deep-rooted often tufted clover-like plant about 1 ft. high, somewhat appressed-pubescent, the st. rather sparsely leafy: lower lvs. with oblong terminal lft. 1 in. long or more, the lateral lfts. much smaller or sometimes lacking; upper lvs. with lfts. often numerous and not very unequal: heads single or in pairs at the ends of the branches, each subtended by 1 or more digitate leafy bracts; fls. numerous, closely sessile, small, varying from pale or bright yellow to deep red; calyx hairy, much inflated, contracted at the mouth: fr. few-seeded, inclosed in the calyx. (*Vulneraria*: Latin *wound*, from its ancient use in healing wounds). Eu. and W. Asia, where it is grown for forage, but little used in this country; sometimes planted for ornament.

43. **ONOBRYCHIS**, Gaertn. A genus contributing two cult. species, one known as sainfoin which is used as forage; species 80 or more, Eu., N. Afr., and W. Asia.—Perennial, herbaceous or sometimes shrubby and spiny: lvs. odd-pinnate, the lf.-stalks sometimes persisting and developing into thorns; lfts. entire, without stipels: fls. papilionaceous, purplish, rose-colored, whitish, or yellowish, in axillary peduncled spikes or racemes; calyx campanulate, with almost equal subulate teeth; standard obovate or obcordate, narrowed toward base; wings short; keel obtuse, equaling or longer than the standard; stamens 9 and 1; ovary sessile or shortly stalked, 1-2-ovuled: fr. compressed, strongly veined or pitted, prickly, toothed, crested on the back, seldom 2-celled. (*Onobrychis*: Greek *asses' food*.)

Fr. about  $\frac{1}{4}$ in. long, toothed on the back: lfts. about 1 in. long.....1. *O. viciæfolia*  
Fr. nearly  $\frac{3}{4}$ in. long, with a deeply lobed crest on the back: lfts. not  
 $\frac{1}{2}$ in. long.....2. *O. Cristagalli*

1. **O. viciæfolia**, Scop. (*O. sativa*, Lam. *Hedysarum Onobrychis*, Neck.). SAINFOIN or SAINTFOIN. HOLY CLOVER. ESPARCET. Sts. ascending 1-1 $\frac{1}{2}$  or rarely 2 ft.: stipules brown, thin, tapering to a fine point; lfts. numerous, oblong, apiculate, about 1 in. long, slightly pubescent beneath: peduncle longer than the lvs., the short spike lengthening in age; calyx-teeth very slender, longer than the tube; corolla pale pink, the standard and keel longer than the wings: fr.  $\frac{1}{4}$ in. long, almost semicircular, strongly reticulate and often toothed on the sides, margined and toothed on the back. Cent. and S. Eu., temp. Asia.—Seldom grown for forage in N. Amer., mostly far W.

2. **O. Cristagalli**, Lam. More or less gray-hairy: st. prostrate or ascending: lvs. with 5-8 pairs of lfts.: lfts. oblong or obovate, cuneate, obtuse or retuse, mucronate, not  $\frac{1}{2}$ in. long; fls. small; calyx-teeth lanceolate-subulate, four to five times as long as the tube; corolla flesh-colored, about as long as the calyx-teeth: fr. nearly  $\frac{3}{4}$ in. long, coarsely pitted and spinose on the sides, crested dorsally, the crest deeply 3-4-lobed with toothed oblong lobes  $\frac{1}{4}$ in. long or more. Medit. region.—Grown for ornament or as a curiosity.

44. **CORONILLA**, L. Shrubs and herbs, grown in the greenhouse or out-of-doors; species about 20, Canary Is., Medit. region, W. Asia.—Annual or perennial, often woody, glabrous or rarely silky-hairy: lvs. odd-pinnate;

lfts. entire: fls. papilionaceous, yellow or sometimes purple or white and purple-veined, pendent, in long-stalked axillary umbels; calyx short-campanulate, almost equally 5-toothed; standard orbicular, keel incurved, wings obovate or oblong; stamens 9 and 1: fr. slender, terete or 4-angled, separating into 1-seeded joints; seeds oblong. (Coronil-la: Latin *a little crown*, from the arrangement of the fls.)

Fls. yellow: plants shrubby, at least at base.

Claw of petals much longer than calyx.....1. *C. Emerus*

Claw of petals scarcely exceeding calyx.....2. *C. glauca*

Fls. pinkish-white: plants herbaceous.....3. *C. varia*

1. **C. Emerus**, L. (*Emerus major*, Mill.). SCORPION SENNA. Dense symmetrical shrub, evergreen in southern states, glabrous or nearly so, 3-5 ft. or more high, the branches green and striate: lvs. deep glossy green; lfts. 5-9, obovate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; peduncles slender, shorter than the lvs., bearing an umbellate cluster of 3-7 fls.; fls.  $\frac{3}{4}$  in. long, yellow, tipped with red, the claw of the petals much longer than the calyx. Blooms freely spring and summer. (Emerus: ante-Linnæan name of no particular significance.) S. Eu.

2. **C. glauca**, L. Glabrous shrub 2-4 ft. high: stipules small, lanceolate; lfts. 5-9, obovate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, truncate or very obtuse: peduncles mostly longer than the lvs., bearing umbels of about 7-8 fls.; fls. about  $\frac{1}{2}$  in. long, yellow, the claw of the petals scarcely exceeding the calyx; flowers all the year in S. Calif. S. Eu.

3. **C. varia**, L. CROWN VETCH. Glabrous herb, straggling or ascending, 1-2 ft. high: lvs. sessile or nearly so; lfts. 11-25, oblong or obovate, blunt and mucronate,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; peduncles much longer than the lvs., each bearing at the tip a dense umbel of pinkish-white fls.; corolla about  $\frac{1}{2}$  in. long, the claws of the petals scarcely longer than the calyx. Summer and autumn. Eu.

45. **GLYCYRRHIZA**, L. LICORICE, LIQUORICE. About a dozen species in the Medit. region, trop. Asia, W. Amer., and S. Amer., only one of which appears to be in cult. for its roots from which the licorice of commerce is produced.—Perennial often glandular-hairy herbs or half-shrubs with odd-pinnate lvs.: lfts. of indefinite number, seldom 3-5, entire or minutely glandular-toothed: fls. papilionaceous, white, yellow, blue or violet, in axillary racemes or spikes which are peduncled or sessile. (Glycyrrhi-za: Greek *sweet root*.)

**G. glabra**, L. From 2-3 ft. high: lfts. 9-17, ovate, subretuse, subglutinous beneath: spikes peduncled, shorter than the lvs.; fls. pale blue, the calyx glandular-pubescent: fr. glabrous, 3-4-seeded. Summer and autumn. Several wild forms in the Medit. region.—Extensively cult. in Eu. and Asia, whence our supply is derived; experimentally grown in the U. S.; it also has medicinal value.

46. **GALEGA**, L. Bushy perennials, one of which is frequently cult. in Amer.; 3 species in S. Eu. and W. Asia.—Glabrous erect herbs with odd-pinnate lvs.: lfts. numerous, entire: fls. papilionaceous, blue or white, in terminal and axillary racemes; bracts small, setaceous, mostly persistent; calyx with almost equal teeth; petals clawed; standard broad; wings somewhat joined to keel: pod linear, terete, tipped with the persistent style. (Gale-ga: Greek for *milk*; supposed to increase the flow of milk.)

**G. officinalis**, L. GOATS RUE. From 2-3 ft. high: lfts. oblong or oblong-ovate, retuse or mucronate, sometimes nearly 2 in. long: fls. purplish-blue, about  $\frac{1}{2}$  in. long. Eu., W. Asia.—Vars. are in cult. with white, lilac, or rose-colored fls., the last sometimes double.

47. **INDIGOFERA**, L. INDIGO. Species probably 300, in trop. regions of the world and extending to the Cape region of S. Afr., several native to U. S.; some grown for ornament, and others cult. in various parts of the world for indigo.—Shrubs and perennial herbs of various habit, more or less silky-hairy: lvs. odd-pinnate (rarely digitate), or sometimes simple (1-foliate): fls. papilionaceous, usually small, in axillary racemes or spikes, in color ranging

from purple to rose and white; keel with a spur or swelling on either side; stamens 9 and 1: fr. various, usually with thin partitions between the seeds. (Indigofera: Latin *indigo bearing*.)

- Fr.  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, strongly curved: lfts.  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long.....1. *I. suffruticosa*  
 Fr.  $1\frac{1}{4}$ –2 in. long, not strongly curved: lfts. mostly  $\frac{1}{2}$  in. long or less.  
 Lfts. fewer than 13–21, not apiculate.....2. *I. tinctoria*  
 Lfts. 13–21, apiculate.....3. *I. Gerardiana*

1. *I. suffruticosa*, Mill. (*I. Anil*, L. *I. tinctoria*, Auth., not L.) Shrub 3–6 ft. high: sts. erect, strigillose, angular, sparingly branched: lvs. odd-pinnate; lfts. 7–15, thin, oblong, oblanceolate or obovate,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, mucronate, acute at base, strigillose, often glabrous or glabrate above: racemes many-fl'd., shorter than the subtending lvs.; pedicels about  $\frac{1}{2}$  in. long, finally recurved; calyx appressed-pubescent, the lobes about as long as the tube; corolla orange, about  $\frac{1}{6}$  in. long: pods stout,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long,  $\frac{1}{8}$  in. wide, curved, thickened at the sutures. Summer and autumn. W. Indies.—One of the sources from which the natural indigo of commerce is obtained.

2. *I. tinctoria*, L. Similar to *I. suffruticosa*, but with lfts. commonly smaller, and pods narrower and longer and nearly straight. Cosmopolitan in the tropics.—Also a source of the indigo of commerce.

3. *I. Gerardiana*, Grah. (*I. Dosua*, Hort., not Hamilt. *I. floribunda*, Hort.). Much-branched shrub 2–6 ft. high, with silvery-canescient branchlets: lvs. odd-pinnate, 2–3 in. long; lfts.  $\frac{3}{8}$ – $\frac{1}{2}$  in. long, obovate or oval, covered with gray appressed hairs, the apex notched or rounded and bristle-tipped: racemes 3–5 in. long, bearing numerous rose-purple fls.  $\frac{1}{2}$  in. long; calyx appressed-downy: fr. deflexed when ripe,  $1\frac{1}{2}$ –2 in. long,  $\frac{1}{8}$  in. wide, cylindric. Summer. (Named for John Gerarde, 1545–1607, perhaps the best known of the herbalists.) Himalayas.—Cult. for ornamental purposes. Some of the plants passing under this name are undoubtedly to be referred to *Lespedeza formosa*.

48. **WISTERIA**, Nutt. (*Kraunhia*, Raf.). Woody twiners, planted for covering porches, arbors, and buildings, 2 recognized species in E. U. S., and 4 in E. Asia.—Vines often attaining great age and with woody trunks reaching several in. diam.: lvs. with 9–19 lfts.: fls. pea-like, blue, lilac, purplish, or white, in long drooping racemes in late spring and early summer; calyx 5-toothed, the upper 2 teeth often somewhat grown together, the lower often longer; standard large, reflexed, typically with 2 callosities or appendages at base above claw; wings falcate, auricled at base; keel obtuse, scythe-shaped; stamens 9 and 1: fr. an elongated, 2-valved, torulose pod. (Wisteria: named for Caspar Wistar, 1761–1818, professor of anatomy in the Univ. of Penna., but spelled Wisteria by Nuttall, author of the genus, the spelling Wistaria being a later adaptation; see page 11.)

- Lfts. 7–9 pairs.....1. *W. floribunda*  
 Lfts. usually fewer.  
 Lvs. glabrous or nearly so at maturity.  
 Racemes 6–12 in. or more in length.....2. *W. sinensis*  
 Racemes 4–5 in. or less in length.....3. *W. frutescens*  
 Lvs. persistently velvety at maturity.....4. *W. venusta*

1. *W. floribunda*, DC. (*W. brachyotrys*, Sieb. & Zucc.). JAPANESE WISTERIA. Deciduous shrub with twining branches, at least when young: lvs. odd-pinnate, 10–15 in. long, densely appressed-downy when young, becoming glabrate; lfts. 15–19, ovate-elliptic, rather abruptly acuminate, rounded at base: fls. violet or violet-blue, in moderately long racemes (or these rather short, particularly near the end of the season); standard oblong-orbicular, subcordate at base and auriculate, with a short stipe-like claw; calyx hairy, the 2 upper teeth very short and broad. Japan.—Distinguished from the Chinese wisteria by smaller more numerous lfts. shed earlier in autumn, and by the fls. blooming two to three weeks later. Forms with white, rose, or pink fls. are in cult. Var. *macrobotrys*, Bailey (*W. macrobotrys*, Sieb. *W. multijuga*, Van Houtte), has racemes sometimes 2–3 ft. long. A slender-racemed form has a purple calyx, soft purple standard with creamy-white eye-blotch, wings and keel dark blue, the tip of the keel violet; racemes  $2\frac{3}{4}$  ft. long.

2. *W. sinensis*, Sweet (*W. chinensis*, DC.). CHINESE WISTERIA. Lvs. silky with appressed hairs when young, glabrous or nearly so at maturity; lfts. about

11. ovate-acuminate or ovate-lanceolate, short-stalked, 2-3 in. long; racemes 6-12 in. long, terminating the branches; calyx villous; corolla large, blue-violet, showy, not fragrant. China.—Apparently little cult. in this country. White-fl. forms are known.

3. *W. frutescens*, Poir. Stout climber 30-40 ft. in length, the trunk attaining several in. diam.: herbage somewhat pubescent; lfts. 9-15, ovate to ovate-lanceolate, acuminate but blunt at apex: racemes dense, 3-6 in. long; fls. lilac-purple,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; calyx finely pubescent, sometimes with club-shaped glands, the teeth shorter than the tube; auricles of the standard rather prominent. Spring and summer. Va. to Fla., Ark. and Tex.—Var. *magnifica*, Herincq (*W. magnifica*, Hort.), has racemes 50-60-fl. and 6-8 in. long, fls. 1 in. across, lilac with a yellow spot.

4. *W. venusta*, Rehd. & Wils. SILKY WISTERIA. Reaching 30 ft. or more, the young parts pubescent: lfts. 9-13, velvety on both sides, oblong-lanceolate or elliptic to ovate-oblong, short-acuminate: racemes 6 in. or less long including the short peduncle, the rachis densely appressed-villous; fls. very large, white, on nearly horizontal pedicels; upper calyx-teeth subulate; standard suborbicular, auricled at base: fr. compressed, densely velvety. China.

49. *APIOS*, Moench. Five twining herbs with tuber-bearing roots, occasionally planted, 2 species in E. N. Amer. and 3 in Asia.—Lvs. odd-pinnate; lfts. 3-9, ovate-lanceolate, obscurely stipellate: fls. papilionaceous, in short, dense, often branching racemes; calyx somewhat 2-lipped, the 2 lateral teeth being nearly obsolete, the upper united and very short, the lower one longest; standard broad, reflexed; keel incurved, finally coiled; stamens 9 and 1: fr. straight or slightly curved, linear, elongate, thickish, many-seeded. (*A-pios*: Greek *pear*, alluding to the shape of the tubers.)

*A. tuberosa*, Moench (*Glycine Apios*, L.). GROUNDNUT. WILD BEAN. Climbing 4-8 ft. high: root bearing strings of edible tubers 1-2 in. long: lfts. 5-7: fls. chocolate-brown, fragrant, blooming in late summer; standard without appendages at summit. N. B. to Minn., south to Fla. and La.

50. *CHORIZEMA*, Labill. Small evergreen shrubs grown in Calif. and sometimes in greenhouses; species 15, in Australia.—Diffuse plants with weak slender sts.: lvs. simple, thick and shining, often spiny-toothed: fls. pea-like, red or orange, in terminal racemes in spring and summer; calyx-lobes 5, the 2 upper ones mostly broader; petals clawed; standard very broad, keel short; stamens free: fr. short, not constricted. (*Choriz-ema*: fanciful Greek name.)

Fls. many, with purple-red wings and keel.

Standard light orange.....1. *C. varium*

Standard scarlet-red.....2. *C. cordatum*

Fls. few, orange-red.....3. *C. ilicifolium*

1. *C. varium*, Benth. (*C. elegans*, Hort.). Erect, 4-6 ft. high, pubescent on branches, infl. and under side of lvs.: lvs. cordate-ovate, undulate, prickly-toothed, 2 in. long or less: fls. many, about  $\frac{1}{2}$  in. long; standard light orange, wings and keel purple-red.—There are garden forms with larger and brighter fls.

2. *C. cordatum*, Lindl. (*C. superbum*, Lem.). Slender glabrous shrub to 10 ft. high, with weak branches: lvs. cordate-ovate to ovate-lanceolate (roundish in one var.), 2 in. long or less, small-toothed and more or less prickly: fls. many; standard scarlet-red, wings and keel purple-red.

3. *C. ilicifolium*, Labill. Plant low and diffuse, glabrous, with slender, erect or drooping branches: lvs. ovate to lanceolate, 1 in. long, sometimes cordate at base, thick, coarsely veined, strongly undulate and with prickly teeth or lobes: racemes loose; fls. few, orange-red.

51. *ULEX*, L. FURZE. GORSE. WHIN. About 20 species of spiny shrubs, one grown as a cover-plant and for ornament, native in W. and S. Eu. and N. Afr.—Lvs. mostly reduced to scales or represented by the thorn-like lf.-stalk, only the young vigorous shoots near the ground bearing fully developed lvs.: fls. papilionaceous, yellow, showy, axillary, often crowded toward the ends of the branchlets; calyx deeply 2-lipped; petals clawed, of almost equal length;



standard ovate, wings and keel obtuse; stamens alternately longer and shorter: pod small, few-seeded. (Ulex: ancient Latin name for this or a similar plant.)

**U. europæus**, L. Much-branched, bushy, 2-4 ft. high; branchlets striate, villous when young; lvs. scale-like or narrow-lanceolate, pubescent: fls. about  $\frac{3}{4}$  in. long, 1-3 in the axils, crowded toward the ends of the branchlets; corolla bright yellow, fragrant; calyx yellow, hairy: fr. oblong, over  $\frac{1}{2}$  in. long, villous, dark brown. Spring and early summer and often again in autumn; in Calif. blooms almost the entire year. W. and S. Eu., somewhat naturalized in N. Amer.—A double-flid. and a less spiny var. are offered.

**52. LABURNUM**, Griseb. Ornamental deciduous trees or shrubs, of 3 species in S. Eu. and W. Asia, often included under *Cytisus*.—Lvs. alternate, petioled, 3-foliolate, without stipules: fls. papilionaceous, slender-pedicelled, in simple terminal mostly pendulous racemes; calyx 2-lipped, with short teeth; corolla yellow; keel shorter than the wings; stamens monadelphous; ovary stalked: fr. linear, compressed, several-seeded, both sutures thickened or the upper winged; seeds without appendage at base. (Laburn-um: ancient Latin name.)—All parts of the plants are said to be poisonous, especially the young frs.

Pod with upper suture thickened and keeled but not winged.....1. *L. anagyroides*  
Pod with upper suture winged.....2. *L. alpinum*

1. **L. anagyroides**, Medic. (*L. vulgare*, Griseb. *Cytisus Laburnum*, L.). GOLDEN-CHAIN. BEAN-TREE. Large shrub or small tree 20-30 ft. high, with erect or spreading branches often close to the ground; branchlets appressed-pubescent, grayish-green: lvs. on petioles 2-3 in. long; lfts. elliptic or elliptic-ovate,  $1\frac{1}{2}$ -3 in. long, usually obtuse and mucronulate, downy beneath: racemes silky-pubescent, 4-8 in. long; fls. about  $\frac{3}{4}$  in. long: fr. 2-3 in. long, the upper suture thickened and keeled but not winged. Late spring and early summer. (Anagyroides: like Anagris, a genus in Leguminosæ.) Cent. and S. Eu.—Vars. with curled or yellow lvs. and with smaller fls. are often cult.

2. **L. alpinum**, Griseb. (*Cytisus alpinus*, Mill.). SCOTCH LABURNUM. Shrub or tree to 30 ft., similar to the foregoing but of stiffer and more upright growth: lvs. with a stalk 1-2 in. long; lfts. usually elliptic, acute, deep green, not so downy beneath as in No. 1; racemes slender, 10-15 in. long: fr. flat, the upper suture flattened out into a thin edge or wing. Summer. S. Eu.—A var. with pendulous branches is offered, **L. Watereri**, Dipp. (*C. alpinus*  $\times$  *C. vulgaris*, Wittst.), a hybrid of garden origin but also found wild. The long slender racemes and the under side of the lvs. are sparingly pubescent; the pod is slightly appressed-pubescent, narrowly winged and few-seeded; sometimes regarded as a var. of *L. alpinum*.

**53. CYTISUS**, L. BROOM. Free-flowering woody plants widely grown in greenhouses and in the open in mild climates; about 50 species in S. Cent. Eu., Canary Isls., N. Afr., and W. Asia.—Low shrubs or rarely small trees, seldom with thorn-tipped branches: lvs. trifoliolate, sometimes unifoliolate, rather small, alternate, deciduous or persistent, sometimes few and minute and the branches almost leafless: fls. papilionaceous, axillary or in terminal heads or racemes, yellow, white, or purple; stamens monadelphous; style curved: fr. flat, dehiscent, the few to many seeds with a callous appendage at base. (Cyt-isus: Greek name for a kind of clover.)

Calyx tubular, much longer than wide.

Fls. in terminal heads with bracts at base, yellow or white.....1. *C. leucanthus*

Fls. axillary, distributed along the branches.

Shrub to 12 ft. high, with pubescent branches: fls. white.....2. *C. proliferus*

Shrub to 2 ft. high, glabrous: fls. commonly purple.....3. *C. purpureus*

Calyx campanulate, as long as or only slightly longer than wide.

Fls. axillary along the branches.

Color of fls. white.....4. *C. fragrans*

Color of fls. yellow or partly crimson, rarely pale.

Style slightly curved, shorter than keel.....5. *C. præcox*

Style spirally incurved, longer than keel.....6. *C. scoparius*

Fls. in terminal racemes.

Racemes dense and rather short.....7. *C. canariensis*

Racemes rather loose, 2-4 in. long.....8. *C. racemosus*

1. *C. leucanthus*, Waldst. & Kit. Deciduous shrub to 3 ft. high, with villous branches: lfts. 3, oblong-ovate or elliptic,  $\frac{1}{3}$ –1 in. long, obtuse or acutish, often mucronate, appressed-pubescent or above sometimes glabrous, ciliate: fls. 3–6, in terminal bracted heads, yellowish-white (in one var. pale yellow); calyx and corolla appressed-villous outside: fr. about 1 in. long, appressed-villous. Summer. S. E. Eu.—Var. *schipkaensis*, Dipp., is a low shrub about 1 ft. high with white fls. Bulgaria.

2. *C. proliferus*, L. To 12 ft. high, the branches long, slender and pubescent: lfts. oblanceolate, 1–1 $\frac{3}{4}$  in. long, silky-pubescent beneath, green and sparsely pubescent above: fls. axillary, white, 3–8 on rather long tomentose pedicels; calyx tomentose; standard pubescent outside: fr. densely tomentose-villous, 1 $\frac{1}{2}$ –2 in. long. Late spring and early summer. Canary Isls.

3. *C. purpureus*, Scop. Glabrous deciduous shrub to 2 ft. high, procumbent or erect: lvs. with petioles  $\frac{1}{4}$ –1 in. long; lfts. oval or obovate,  $\frac{1}{2}$ –1 in. long, dark green above: fls. 1–3, axillary, purple; calyx reddish: fr. black, 1–1 $\frac{1}{2}$  in. long. Spring and summer. S. Austria.—There exist vars. with fls. colored white, pink, or dark purple.

4. *C. fragrans*, Lam. (*Genista fragrans*, Hort.). Shrub with erect branches: lvs. short-petioled, 3-foliolate, early deciduous; lfts. lanceolate, densely pubescent: fls. axillary, fragrant, white; wings and standard somewhat longer than the keel: fr. oblong, flat, shortly stalked. Spring. Teneriffe.

5. *C. præcox*, Bean (*C. multiflorus*  $\times$  *C. purgans*, *Genista præcox*, Hort.). Deciduous shrub to 10 ft., with slender erect or arching branches; branchlets grooved, at first pubescent: lfts. usually 1, sometimes 3, short-petioled, oblanceolate or linear-spatulate, to  $\frac{3}{4}$  in. long: fls. 1–2, yellowish-white, nearly  $\frac{1}{2}$  in. long, very numerous along the slender branches: fr. appressed-pubescent, about 1 in. long, usually 2-seeded. May. Of garden origin, and one of the most floriferous of all brooms.—One of the parent plants, *C. multiflorus*, Sweet, a native of Spain and N. Afr., has white fls.; the other, *C. purgans*, Willd., from Spain and S. France, has yellow fls. There are dwarf vars. and forms with yellow and white fls.

6. *C. scoparius*, Link. (*Spartium scoparium*, L. *Genista scoparia*, Hort.). SCOTCH BROOM. Deciduous shrub to 10 ft., with erect slender branches: lvs. short-petioled, 1–3-foliolate; lfts. obovate or oblanceolate,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, slightly appressed-pubescent: fls. usually solitary in the axils,  $\frac{3}{4}$  in. long, bright yellow or in vars. pale yellow; calyx and pedicels nearly glabrous: fr. brownish-black, villous only at margin, otherwise glabrous. Spring and summer. Cent. and S. Eu.; naturalized in N. Amer.—There is a var. with slender pendulous branches and one with double fls. Var. *Andreanus*, Dipp. (*Genista Andreana*, Puissant), has fls. yellow with dark crimson wings.

7. *C. canariensis*, Kuntze (*Genista canariensis*, L.). GENISTA of florists. Evergreen much-branched shrub to 6 ft., with villous-pubescent branches: lfts. cuneate, obovate or oblong-obovate,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, rounded at apex, pubescent on both sides, fls. fragrant, bright yellow, in terminal, many-fld., dense, rather short racemes. Spring and summer. Canary Isls.—Var. *ramosissimus*, Briq. Lfts. very small, glabrous above; racemes short but numerous.

8. *C. racemosus*, Nichols., not Marn. (*Genista formosa* and *racemosa*, Hort.). Evergreen shrub to 6 ft., with pubescent branches: lvs. rather long-petioled; lfts. oblong-obovate,  $\frac{1}{3}$ – $\frac{3}{4}$  in. long, mucronulate, silky-pubescent on both sides: fls. yellow, in many-fld., secund, rather loose racemes 2–4 in. long. Probably of garden origin and hybrid between *C. canariensis* and another var.

54. GENISTA, L. Upwards of 100 species in Eu., Canary Isls., N. Afr., and E. Asia, a few planted in the hardy border.—Deciduous or evergreen shrubs, sometimes nearly leafless, unarmed or spiny; branches usually striped and green: lvs. alternate, rarely opposite, entire, simple or sometimes 3-foliolate: fls. papilionaceous, in terminal racemes or heads, rarely axillary, yellow or sometimes white; calyx 2-lipped, the upper lip deeply 2-parted; style incurved: fr. almost globular to narrow-oblong, 1- to many-seeded, rarely indehiscent. (Genis-ta: ancient Latin name.)—Allied to Cytisus, but without callous appendage at base of seeds. The Genista of florists is Cytisus.

- |                                |                         |
|--------------------------------|-------------------------|
| Corolla white, silky.....      | 1. <i>G. monosperma</i> |
| Corolla yellow, glabrous.....  |                         |
| Twigs striped, not winged..... | 2. <i>G. tinctoria</i>  |
| Twigs broadly 2-winged.....    | 3. <i>G. sagittalis</i> |

1. *G. monosperma*, Lam. To 10 ft. or more high, with slender grayish branches, almost leafless: lvs. simple or rarely 3-foliolate, linear or linear-spatulate,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, silky: fls. about  $\frac{1}{2}$  in. long, white, fragrant, in short lateral racemes; calyx purple; corolla silky: fr. broadly oval,  $\frac{1}{2}$  in. long, 1–2-seeded. Early spring. Spain, N. Afr.

2. *G. tinctoria*, L. (*G. sibirica*, Hort. *G. polygalæfolia*, Hort., not DC.). DYERS GREENWEED. Branches striped, glabrous or slightly pubescent, flowering sts. to 3 ft. high: lvs. oblong-elliptic or oblong-lanceolate,  $\frac{1}{2}$ –1 in. long, nearly glabrous, ciliate: racemes many-fl'd., 1–3 in. long, panicked at the ends of the branches; corolla yellow, glabrous: fr. narrow-oblong,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, glabrous or slightly pubescent, 6–10-seeded. Summer. Eu., W. Asia; naturalized in N. Amer.

3. *G. sagittalis*, L. (*Cytisus sagittalis*, West. & Koch). Dwarf procumbent shrub less than 1 ft. high, with ascending or erect mostly simple broadly 2-winged branches: lvs. ovate to oblong,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, villous: fls. yellow, in terminal racemes 1–1 $\frac{1}{2}$  in. long; corolla glabrous: fr. linear-oblong,  $\frac{3}{4}$  in. long, silky. Late spring and early summer. Eu., W. Asia.

55. **SPARTIUM**, L. (*Spartianthus*, Link). One shrub native in the Medit. region and Canary Isls., hardy in the S. and Cent. U. S.—Allied to Genista and Cytisus but chiefly distinguished by the 1-lipped calyx: branches leafless or with few lvs.: lvs. alternate, simple, small: fls. papilionaceous, in loose terminal racemes; calyx split above, hence 1-lipped, with 5 minute teeth; keel incurved, acuminate: fr. linear, compressed, many-seeded; seeds with callous appendage at base as in Genista. (Spar-tium: the ancient Greek name.)

**S. junceum**, Lam. (*Genista juncea*, Lam.). SPANISH BROOM. To 10 ft. high, the long slender, terete, green branches rush-like and sparingly leafy or almost leafless: lvs. few, oblanceolate to linear,  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long, entire, bluish-green and slightly appressed-pubescent: fls. fragrant, yellow, about 1 in. long, with showy standard; lower edge of keel hairy: fr. pubescent, 2–3 in. long. Summer and autumn, in Calif. blooming almost the entire year.—There is a double-fl'd. form, and also a var. with whitish fls.

56. **CERCIS**, L. **JUDAS-TREE**. **RED-BUD**. Ornamental deciduous trees or shrubs, of 8 species in N. Amer., and from S. Eu. to Japan.—Branches spreading, forming a broad irregular head when older: lvs. alternate, petioled, palmately nerved, entire: fls. papilionaceous, pedicelled, pink or red, in clusters or racemes from the old wood; calyx 5-toothed, red; uppermost petals somewhat smaller than the others; stamens 10, distinct: fr. compressed, narrow-oblong, narrow-winged on the ventral suture, many-seeded. (Cer-cis: ancient Greek name.)

Lvs. abruptly short-acuminate.

Fls.  $\frac{1}{2}$  in. long. .... 1. *C. canadensis*

Fls.  $\frac{3}{4}$  in. long. .... 2. *C. chinensis*

Lvs. rounded or emarginate at apex, usually broader than long. .... 3. *C. Siliquastrum*

1. *C. canadensis*, L. Spreading shrub or tree to 40 ft.: lvs. roundish or broadly ovate, 3–6 in. long, broader than long, usually cordate: fls. rosy-pink,  $\frac{1}{2}$  in. long, before the lvs., 4–8 in a cluster: fr. linear-oblong, 2 $\frac{1}{2}$ –3 $\frac{1}{2}$  in. long, acute at each end. N. J. south, west to Mich., Mo. and Tex.—There is a white-fl'd. and a double-fl'd. var.

2. *C. chinensis*, Bunge (*C. japonica*, Sieb.). In the wild a tree to 50 ft., but a shrub in cult.: lvs. deeply cordate, roundish, 3–5 in. long, with a whitish transparent line at margin, rather thick, glabrous, shining above: fls. 5–8 in a cluster, purplish-pink,  $\frac{3}{4}$  in. long: fr. 3–5 in. long, narrow, acuminate. China, Japan.

3. *C. Siliquastrum*, L. Shrub or tree to 40 ft.: lvs. roundish, 3–5 in. wide, deeply cordate, glabrous: fls. 3–6 in a cluster, purplish-rose or in a var. white,  $\frac{3}{4}$  in. long: fr. 3–4 in. long, flat and thin. (*Siliquastrum*: *siliqua*, in reference to the fr.) S. Eu., W. Asia.

57. **BAUHINIA**, L. **MOUNTAIN-EBONY**. **ORCHID-TREE**. About 150 species of trees and shrubs, sometimes tall-climbing, in the tropics of both hemispheres, planted in S. Fla. and S. Calif.—Plant unarmed or spiny: lvs. broad, entire or in ours 2-cleft or lobed, in some cases the lfts. being entirely distinct, the

petiole (or midvein) prolonged into a short but characteristic awn between the lfts.: fls. white, seldom rose, red or purple, in simple or paniced terminal or axillary racemes; calyx shortly or not at all toothed before flowering, variously lobed or cleft at flowering-time; petals 5, somewhat unequal, usually narrowed into a claw; stamens 10, distinct or nearly so, or sometimes reduced even to 3 and perhaps bearing sterile filaments; ovary often stalked: fr. a long flat pod, dehiscent or indehiscent. (Bauhin-ia: after John and Caspar Bauhin, 16th century herbalists, the twin lfts. suggesting two brothers.)

Plant more or less climbing.

Lvs. 1-3 in. long. .... 1. *B. Galpini*

Lvs.  $\frac{3}{4}$ -1  $\frac{1}{2}$  ft. long. .... 2. *B. Vahlîi*

Plant upright, a bush or tree.

Fls. white. .... 3. *B. grandiflora*

Fls. colored.

Lvs. 1-2 in. long: fr. 4-5 in. long. .... 4. *B. tomentosa*

Lvs. longer.

Fr. 1 ft. long: lvs. cleft one-third to one-half their length. .... 5. *B. purpurea*

Fr. 1-2 ft. long: lvs. cleft one-fourth to one-third their length. .... 6. *B. variegata*

1. *B. Galpini*, N. E. Br. Half-climbing shrub, 5-10 ft. high: lvs. 1-3 in. long, 2-lobed from one-fifth to one-half their length, 7-nerved; petiole about  $\frac{1}{4}$  in. long: racemes 6-10-fld.; fls. borne continuously from spring to late autumn; petals 5, all alike, 1- $\frac{1}{2}$  in. long, the claw as long as the orbicular, cuspidate, brick-red limb; fertile stamens 3: fr. 3-5 in. long; seeds dark brown. (Bears the name of E. E. Galpin, an early collector of this species.) S. and trop. Afr.

2. *B. Vahlîi*, Wight & Arn. An enormous climber, with densely pubescent branchlets and abundant circinate tendrils; pubescence gray or ferruginous: lvs. subcoriaceous,  $\frac{1}{4}$ -1  $\frac{1}{2}$  ft. long, broader than long, 11-13-nerved, cleft one-fourth to one-third their length, with an open sinus and broadly rounded lobes, persistently downy beneath: racemes long-peduncled, terminal, dense subcorymbose, with tomentose pedicels 1-1  $\frac{1}{2}$  in. long and persistent linear bracteoles; calyx-tube slender,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, the limb somewhat longer and splitting into 2-3 lobes; petals white, fading yellowish, 1 in. long, obovate, with short claw, densely hairy without; ovary densely brown-tomentose, short-stalked, tipped with a long style: fr. subliguous, rusty-downy,  $\frac{3}{4}$ -1 ft. long, 8-12-seeded, finally dehiscent. (Named for Martin Vahl, 1749-1804, Danish botanist.) Himalayas.

3. *B. grandiflora*, Juss. Tree to 20 ft. high: lvs. oval or subcordate, tomentose beneath, shortly cleft, the lobes ovate, obtuse, 3-4-nerved; stipules spiny: fls. very large, pure white, opening at night, 1-3 on axillary peduncles; petals obovate, acute at apex, clawed. Peru.

4. *B. tomentosa*, L. ST.-THOMAS-TREE. Erect branching shrub 1-15 ft. high; branchlets, lower surface of lvs. and pods somewhat tomentose: lvs. 1-2 in. long, broader than long, leathery, 7-nerved, split one-third to one-half way to the base, the lobes obtuse: fls. mostly in axillary pairs (sometimes 1 or 3) on pedicels bearing a pair of bractlets; calyx entire or with 2 small teeth at apex; corolla  $\frac{3}{4}$ -2 in. long, obovate, much exceeding calyx, yellow with a red blotch on upper petal: fr. stalked, 4-5 in. long. India.

5. *B. purpurea*, L. (*B. triandra*, Roxb.). Tree of small to medium size: lvs. leathery, glabrous, somewhat cordate, 3-5 in. long, cleft one-third to one-half their length, 9-11-nerved, the lobes obtuse or somewhat acute: fls. 3-4 in. across, in few-fld. axillary or terminal corymbs, fragrant; petals oblancoate, acute, red, one of them white-streaked on the claw, or varying in color from almost white to rich purple; fertile stamens 3-4, very long, the remainder sterile or abortive: fr. 1 ft. long. India, Burma, China.

6. *B. variegata*, L. Tree 6-20 ft. high, much like *B. purpurea* in habit: lvs. 3-4 in. across, 9-11-nerved, somewhat broader than long, cleft one-fourth to one-third the length, the lobes rounded; petiole 1-2 in. long: fls. about 7, in a short raceme or corymb, 4 in. across; calyx spathe-like; petals 5, obovate-oblong, clawed, rose-colored and variegated with red and yellow, the lowest one largest, broader above the middle, strongly marked with crimson: fr. 1-2 ft. long. India.—The coloring of the fls. varies. One var. has white fls. beautifully veined with green.

58. *PARKINSONIA*, L. Trop. and subtrop. trees or shrubs, of 5 species, 1 S. African, 1 S. American, 3 trop. and N. American.—Bark thin, smooth: lvs. alternate or fascicled, bipinnate, with 1-4 pairs of pinnae, the common



petiole short, the rachis ending in a spine; pinnæ 2-4, the rachilla (in ours) very long, flat and twig-like, bearing numerous small deciduous lfts.; stipules minute or none: fls. yellow or whitish, on slender pedicels in short loose axillary or terminal racemes; calyx 5-parted, produced at base and jointed upon the pedicel; petals 5, clawed, the upper one within and broader than the others, with claw pubescent and nectariferous on the inner side; stamens 10, distinct, hairy at base; ovary several-ovuled, short-stalked: fr. compressed, leathery, linear to linear-oblong, tapering at each end. (Parkinsonia: John Parkinson, 1567-1629, London apothecary, author of "Paradisus Terrestris" and "Theatrum Botanicum.")

**P. aculeata**, L. JERUSALEM-THORN. Small tree to 10 ft. high, glabrous, the slender zigzag branches often pendulous: lvs. short-petioled, the rachis short and spine-tipped; lfts. 8-16 in. long, with flattened twig-like rachilla and numerous very small deciduous linear or oblong segms.: racemes loose, axillary, 3-6 in. long; fls. yellow, fragrant, pendulous on long slender pedicels; calyx glabrous or nearly so, with very short tube and oblong reflexed lobes: fr. narrow, 2-4 in. long, constricted between the seeds; seeds oblong. Probably trop. Amer.

59. **CASSIA**, L. SENNA. Species nearly or quite 400 in trop. or some in cool temp. regions; the herbaceous and shrubby kinds are cult. as border plants and under glass, the arboreous species out-of-doors in the S.; senna lvs. used in medicine as a cathartic are derived from various species.—Lvs. even-pinnate, sometimes much reduced: fls. nearly regular; calyx-teeth nearly equal, mostly longer than the tube; corolla of 5 nearly equal spreading clawed petals; stamens 5 or 10, frequently unequal and some of the anthers abortive, the good anthers commonly opening at the apex: fr. sessile or stalked, terete or flattened, 4-angled or winged, containing numerous seeds and often partitioned crosswise. (Cassia: ancient Greek name.)—Other species of Cassia than those here mentioned are likely to appear in cult., particularly some of the native ones.

Herbage appressed-silky-canescant throughout; lfts. narrowly linear...1. *C. artemisioides*  
Herbage not as above; lfts. broader.

Fls. yellow.

Lfts. tomentose beneath.....2. *C. tomentosa*

Lfts. not tomentose beneath.

Racemes 1 ft. long or more, bearing fls. 2 in. diam. on pedicels

2 in. long: lfts. 2-2½ in. broad.....3. *C. Fistula*

Racemes shorter: lfts. narrower.

Pedicels 2½ in. long; fls. 2 in. across.....4. *C. Beareana*

Pedicels shorter; fls. smaller.

Petiole or rachis of lf. with 1 or more glands on upper side  
near base or between lfts.

Lvs. much longer than the racemes; lfts. 5-10 pairs;

gland near base of petiole.....5. *C. marilandica*

Lvs. mostly shorter than the racemes; lfts. 3 pairs;

gland between the lowest lfts.....6. *C. corymbosa*

Petiole and rachis of lf. without gland.....7. *C. siamea*

Fls. rose-colored or reddish.

Fr. 2 ft. or less long: pedicels not subtended by bracts.....8. *C. grandis*

Fr. 1 ft. long: pedicels subtended by persistent silky bracts.....9. *C. nodosa*

1. *C. artemisioides*, Gaud. Bushy shrub, gray all over with silky appressed pubescence: lfts. 3-4 pairs, narrowly linear, the lower pair with a gland at base: racemes axillary, 5-8-fl'd., the fls. sulfur-yellow, not over ¾ in. across: fr. flat, shining brown. Australia.

2. *C. tomentosa*, L.f. Shrub 10-12 ft. high; twigs and lower surface of lvs. tomentose: lfts. in 6-8 pairs, oblong, rounded and apiculate at apex, each pair with a gland at base: fls. deep yellow, about 1 in. across: fr. compressed, pubescent, about 5 in. long. Mex.

3. *C. Fistula*, L. PUDDING-PIPE-TREE. GOLDEN SHOWER. Tree with large lvs.; petiole and rachis without glands; lfts. 4-8 pairs, ovate, subacuminate but blunt at apex, 2-2½ in. broad, very finely pubescent: racemes loose, pendent, 1 ft. or more long, bearing pale yellow fls. 2 in. diam., on pedicels 2 in. long, without bracts:

fr. cylindric, black, 3-furrowed, 1-2 ft. long, containing 1-seeded compartments. (Fistula: Latin for *tube*, in allusion to the long cylindric pods.) India, but introduced in W. Indies and other trop. countries.—Furnishes the cassia pods of commerce which are used in medicine.

4. *C. Beareana*, Holmes. Tree 20-30 ft. high: lvs. 8-10 in. long; lfts. 8-10 pairs, elliptic, obtuse, rounded or broadly cuneate at base, glabrous,  $1\frac{1}{2}$ -2 in. long; racemes rather short and subcorymbose; pedicels straight, ascending,  $2\frac{1}{2}$  in. long; petals obovate-oblong, often 1 in. long, canary-yellow veined with dark red or chestnut; longer stamens exceeding the petals; filaments distinctly dilated near the middle: fr. glabrous or nearly so, about 30 in. long, 1 in. broad and  $\frac{1}{2}$  in. thick, the sutures not prominent, the dissepiments showing on the surface as transverse lines; seeds dark brown, shining, flat, nearly  $\frac{1}{2}$  in. long. (Named for Dr. O'Sullivan Beare of Pemba, an island of E. Afr.) Trop. Afr.; offered in Fla.

5. *C. marilandica*, L. WILD SENNA. Perennial 3-4 ft. high, glabrous or nearly so, with almost simple sts.: lvs. light green, far exceeding the racemes; stipules subulate-setaceous; petiole with a large raised gland on upper side near base; lfts. 5-10 pairs, oblong to ovate-oblong, mucronate: fls. bright yellow, widely open, in axillary racemes near the ends of the sts. and often appearing paniced: fr. linear, flat. New England, west and south.

6. *C. corymbosa*, Lam. (*C. floribunda*, Hort. *C. floribunda* var. *A. Boehm*, Hort. *C. Boema*, Hort.). Glabrous free-flowering shrub 4-10 ft. high: lvs. mostly shorter than the infl.; lfts. 3 pairs, oblong-lanceolate, acute or acutish, the lowermost with a gland between them: fls. yellow, in long-stalked, small, axillary corymbs. Argentina.—The best-known garden species, blooming spring, summer and autumn in conservatories.

7. *C. siamea*, Lam. Low tree with virgate downy terete branchlets: lvs.  $\frac{1}{2}$ -1 ft. long; stipules minute and caducous; petiole and rachis without glands; lfts. 8-9 pairs, oblong, obtuse and apiculate, subglabrous, glaucous, 2-3 in. long, somewhat coriaceous: racemes corymbose, crowded, both axillary and in a terminal panicle  $\frac{1}{2}$ -1 ft. long; fls. bright yellow: fr. nearly straight, flat, stalked, 6-9 in. long,  $\frac{1}{2}$  in. wide, with thickened sutures. E. Indies and Malaya.

8. *C. grandis*, L. f. PINK SHOWER. Tree 40-50 ft. high; twigs, petioles and infl. covered with rusty or white pubescence: lvs. 6-10 in. long; lf.-stalk without glands; lfts. 8-20 pairs, oblong, rounded at both ends, sparsely and minutely hairy above, pubescent-tomentose beneath: racemes lateral, simple, 4-8 in. long; fls. rose-colored: fr. compressed-cylindric,  $8\frac{1}{2}$  in. to 2 ft. long, about  $1\frac{1}{2}$  in. wide, with transverse partitions within. Trop. Amer.; offered in S. Calif.

9. *C. nodosa*, Buch.-Ham. JOINTWOOD. Tree to 50 ft. high, with slightly downy branches: lvs. 1 ft. or more long; lfts. 6-12 pairs, oblong, acute, 2-4 in. long, subcoriaceous, sparsely short-hairy beneath: racemes from the old branches, dense, not 6 in. long, with silky persistent lanceolate bracts; pedicels about 2 in. long; fls. bright pink or reddish, with petals  $\frac{3}{4}$ -1 in. long: fr. 1 ft. long,  $\frac{1}{2}$  in. thick. May-June. E. Himalayas to Malacca.

60. *DELONIX*, Raf. Unarmed trees with large very showy fls., one of the species much cult. in S. Fla. and the American tropics; species 2-3, natives of Afr.—Broad-topped trees with evenly bipinnate lvs.; stipules lacking; pinnæ with numerous small pinnules: fls. orange or scarlet, not papilionaceous, in terminal or axillary corymbose racemes; calyx deeply 5-lobed, the lobes valvate and nearly equal; petals 5, with long claw and rotund blade; stamens 10, distinct; ovary sessile, many-ovuled: fr. broadly linear, flat, woody, nearly solid between the seeds. (Delo-nix: Greek, referring to the long-clawed petals.)

*D. regia*, Raf. (*Poinciana regia*, Bojer). ROYAL POINCIANA. PEACOCK-FLOWER. FLAMBOYANT. Widely branched rapid-growing tree reaching 20-40 ft. in height: lvs. 1-2 ft. long, with stout petiole and 10-20 pairs of pinnæ, each with 20-40 pairs of small oblong lfts.: racemes of showy fls. 3-4 in. across, with bright scarlet petals, the yellow-striped upper petal more cuneate than the others: fr. 6 in. to 2 ft. long. Madagascar.—A most striking and gorgeous tree planted for shade and ornament in frostless countries as S. Fla., S. Calif., Bermuda, and in the tropics; blooms mostly in summer.

61. *POINCIANA*, L. Ornamental trees or shrubs, grown for their showy fls. and attractive finely divided foliage; a number of species native in trop.

and subtrop. regions.—Unarmed or prickly: lvs. evenly bipinnate: fls. showy, orange, red, or yellow, in panicles or racemes, the bracts commonly early deciduous; calyx-tube short, the 5 lobes unequal, imbricated; petals 5, broad, more or less unequal; stamens 10, distinct, exserted, sometimes very long-exserted; ovary sessile: fr. linear to oblong, usually flat. (Poinciana: M. de Poinci, governor of the Antilles in the 17th century.)

- Lf.-segms.  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, and about half as wide: infl. not at all glandular..... 1. *P. pulcherrima*  
 Lf.-segms. about  $\frac{1}{4}$ – $\frac{1}{2}$  in. long and one-fourth to one-third as wide: infl. densely glandular..... 2. *P. Gilliesii*

1. *P. pulcherrima*, L. (*Cæsalpinia pulcherrima*, Sw.). BARBADOS PRIDE. BARBADOS FLOWER-FENCE. DWARF POINCIANA. A glabrous shrub, sometimes 10 ft. high, with prickly branches: lvs. delicate, evergreen, mimosa-like, with 12–18 pinnæ, each with 20–24 oblique-oblong lfts. about  $\frac{3}{4}$  in. long and half as wide: fls. orange or yellow, about 2 in. wide, long-pedicelled in large loose terminal or axillary racemes or panicles; stamens and style red, long-exserted: fr. thin, broadly linear, 4 in. or less long. Generally distributed in the tropics but its original place is unknown.—There is a yellow-fl. var.

2. *P. Gilliesii*, Hook. (*Cæsalpinia Gilliesii*, Wall.). Climbing or straggling shrub or small tree: lvs. with many pinnæ, these more or less alternate above the lowest pair; ultimate lfts. narrowly oblong,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long and one-fourth to one-third as wide, black-punctate on the lower side near the margins: infl. densely glandular, racemose, terminal; fls. large, light yellow, with brilliant red stamens protruding 3–5 in. (Named for Dr. John Gillies, 1747–1836, discoverer of this plant.) S. Amer.—Showy plant which bears, like *Strelitzia Regina*, in Calif. the popular name of “Bird-of-Paradise.”

62. *GLEDITSIA*, L. HONEY LOCUST. About a dozen species in N. Amer., E. and Cent. Asia, trop. Afr., and S. Amer., planted as avenue or park trees and for hedges.—Large deciduous trees, with spreading branches forming a broad graceful rather loose head, the trunk and branches usually with large branched spines: lvs. alternate, without stipules, abruptly pinnate, some on the same tree partly bipinnate or even a single lf. partly bipinnate: fls. polygamous, in racemes or rarely in panicles; calyx-lobes and petals 3–5, the petals nearly equal, not much longer than the calyx; stamens 6–10, distinct; style short, with large terminal stigma: fr. compressed, mostly large and indehiscent, 1- to many-seeded. (Gledit-sia: after Gottlieb Gleditsch, director of the botanic garden at Berlin; died 1780.)

*G. triacanthos*, L. HONEY or SWEET LOCUST. THREE-THORNED ACACIA. Attaining 140 ft., usually with stout simple or branched spines 3–4 in. long: lvs. 6–8 in. long, pinnate or the same one often both pinnate or bipinnate; lfts. many, oblong-lanceolate, remotely crenulate-serrate,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. long: fls. small, very short-pedicelled, in narrow racemes  $1\frac{1}{2}$ –3 in. long: fr. 12–18 in. long, slightly falcate and at length twisted. May, June. N. Y. and Pa. south to Miss., west to Neb. and Tex.—There are forms unarmed and with smaller lfts., also one with pendulous branchlets.

63. *TAMARINDUS*, L. One species grown throughout the tropics as an ornamental and for its acid frs. which have many uses; probably indigenous to trop. Afr. and possibly to S. Asia.—Tree with alternate equally pinnate lvs., stipules minute, caducous: lfts. small, indefinite in number: fls. irregular, in racemes at the ends of the branches; bracts and bracteoles ovate-oblong, colored, caducous; calyx-tube narrow, the 4 segms. imbricate, membranaceous, colored; the 3 upper petals imbricate, the 2 lower reduced to bristles hidden at base of the staminal tube; fertile stamens 3, the filaments connate below into a sheath open on the upper side, the small staminodes at the tip of the sheath; ovary many-ovuled, on a stalk adnate to the calyx-tube: fr. oblong or linear, compressed, indehiscent, thick and crustaceous without, pulpy within,

septate between the seeds. (Tamarin-dus: from the Arabic *tamar-Hindi*, meaning "Indian date.")

**T. indica**, L. TAMARIND. TAMARINDO. Evergreen tree sometimes 80 ft. high and with a trunk 25 ft. in circumference; bark brownish-gray, somewhat shaggy: lvs. abruptly pinnate, the 20-40 oblong lfts. opposite,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long: fls. about 1 in. broad, few in lax racemes, pale yellow, the petals veined red; calyx-teeth lanceolate, the 2 lowest connate: fr. 3-8 in. long, plump and slightly curved, with a thin brittle shell containing a soft brownish pulp transversely by a few strong branched fibers, inclosing 1-12 large flattened glossy seeds. Fls. Apr.-May in the northern hemisphere, fr. ripening in late autumn and winter.

64. **CERATONIA**, L. A small or moderately large evergreen tree with thick crown, native to the E. Medit. region, now widely cult. for the edible pods.—Lvs. evenly pinnate, with few pairs of broad leathery lfts.: fls. small, polygamo-dicæous, in short single or clustered racemes borne on the old wood; calyx-tube disk-bearing, the 5 short segms. deciduous; petals 0; stamens 5: fr. elongate, compressed, leathery, indehiscent, filled with a pulpy substance between the seeds. (Ceratonia: Greek *horn*, in reference to the large pod.)

**C. Siliqua**, L. CAROB. KNOWN also as ALGAROB, KAROB, CAROUBIER, and ST. JOHNS BREAD. Reaching a height of 40-50 ft.: lvs. with 2-3 pairs of obovate or rotund shining lfts., these obtuse or emarginate,  $1\frac{1}{2}$ -4 in. long: racemes lateral; fls. red: fr. 4-12 in. long. (Siliqua: name in reference to the silique-like fr.)

65. **ADENANTHERA**, L. Unarmed trees allied to Mimosa, one cult. in greenhouses and in warm countries, its bright red seeds being used somewhat for ornamental purposes and also as a food; 3-4 species of trop. Asia, Afr., and Australia.—Lvs. bipinnate or decompound, with many pairs of small lfts.: fls. small, racemose, usually golden-yellow or whitish; stamens 10, scarcely exerted: fr. linear, compressed, mostly cross-walled within. (Adenanthra: from the deciduous pedicellate gland on each anther.)

**A. pavonina**, L. RED SANDALWOOD-TREE. PEACOCK FLOWER-FENCE. Tree reaching a large size in its native habitat: lfts. about 13, oblong or ovate, obtuse, glabrous, about  $1-1\frac{1}{2}$  in. long: fls. in an axillary spike-like raceme, white and yellow in the same cluster: fr. about 8 in. long, becoming much coiled in dehiscing; seeds red, lens-shaped, "Circassian seeds," interesting as curiosities to travelers and used for necklaces and the like. Trop. Asia and Afr.; planted in trop. Amer. and also within our limits; sometimes known as "Circassian Bean."

66. **MIMOSA**, L. About 300 species, chiefly of trop. Amer., grown more or less in warm countries; the plants known to the florists as mimosas are acacias (chiefly *A. armata*).—Trees, shrubs, or herbs of varying habit (sometimes woody climbers), often thorny or prickly, with bipinnate often sensitive lvs. (lvs. sometimes reduced to phyllodia): fls. small, bisexual or polygamous, not papilionaceous, in close heads or spikes; calyx minute or obsolete; petals 4-5, more or less united; stamens 4-10, distinct, exerted; ovary sessile or short-stalked: fr. flat, oblong or linear, breaking up into 1-seeded joints when ripe. (Mimo-sa: Greek *a mimic*, alluding to the fact that the lvs. of some species are sensitive.)

**M. pudica**, L. SENSITIVE-PLANT. HUMBLE-PLANT. Perennial often cult. as an annual, somewhat shrubby, low, branching, hairy and spiny: lvs. sensitive, long-petioled, the 2-4 subdigitate pinnae with numerous linear-oblong segms.: fls. many, purplish, in globular-oblong heads on elongating axillary peduncles: fr. of 3-4 flat rotund 1-seeded joints which separate and fall away leaving the spinose-bristly margins. Continental trop. Amer., but widely naturalized in warm countries, and running wild in the Gulf states.

67. **LEUCÆNA**, Benth. Trees and shrubs with the habit and foliage of acacia, one species cult. in the S. and in Calif.; species 9-10, Mex., Guatemala, Peru, and Pacific Isls.—Evergreen, usually unarmed: lvs. alternate, bipinnate;



lfts. small and in many pairs or large and in few pairs: fls. white, in close heads, usually bisexual, not papilionaceous, the calyx 5-lobed, the 5 petals separate; stamens 10, exserted: fr. stalked, broadly linear, flat, not cross-walled within. (Leucæ-na: probably from Greek *white*, referring to the fls.)

**L. glauca**, Benth. WHITE POPINAC. Spineless tree reaching 30 ft. or more: pinnæ 4-8-paired; lfts. 10-20-paired, oblong-linear to lanceolate, oblique, glaucous below: fls. white, in globose heads to  $1\frac{1}{4}$  in. diam.; petals erect, very narrow, about one-third as long as the stamens: fr. 5-6 in. long. Trop. Amer. but occurring in Fla. and Tex.

68. **ACACIA**, Willd. A marked genus of about 450 species, dispersed throughout the tropics and to some extent in the temp. regions, largely Australian, some species grown out-of-doors in warmer parts of the U. S. and others in cool greenhouses.—Trees or shrubs, seldom herbs, thorny or unarmed: lvs. bipinnate and often with many pairs of lfts. or reduced to lf.-like petioles (phyllodia): fls. small, numerous, bisexual or polygamous, mostly yellow or seldom whitish, in stalked globose heads or cylindric spikes, solitary or in pairs or clusters, or in axillary racemes; calyx toothed, lobed or seldom fringed or lacking; petals distinct or united, sometimes lacking; stamens many, distinct or shortly united at base; ovary sessile or stalked: fr. ovate, oblong or linear, not partitioned within, commonly opening by 2 valves; funicle of seed filiform or ending in a club-shaped aril, either twice encircling the seed or bent back upon itself. (Aca-cia: from Greek meaning a *point* or *thorn*, referring to the parts often spinescent.)—The acacias are grown to some extent in greenhouses, particularly *A. armata*, as a florists' plant. In Calif. any number of species may be grown; but those here described are apparently the most common; for other species the student must consult special treatises.

A. Lvs. all or mostly reduced to phyllodia, i. e., the petiole flattened to resemble a simple lf.

B. Fls. in globose heads.

C. Phyllodia terete or flattened and very narrow.

D. Length of phyllodia not over 1 in.

E. Funicle filiform to its end: fls. 5-merous. .... 1. *A. juniperina*

EE. Funicle ending in enlarged aril: fls. 4-merous. .... 2. *A. tenuifolia*

DD. Length of phyllodia  $1\frac{1}{2}$ -2  $\frac{1}{4}$  in. .... 3. *A. calamifolia*

CC. Phyllodia flat, broader and lf.-like.

D. Longitudinal veins of phyllodia 1 or very rarely 2.

E. Stipules often reduced to spines, persistent.

F. Fr.  $1\frac{1}{2}$ -2 in. long,  $\frac{1}{4}$  in. wide. .... 4. *A. armata*

FF. Fr. 2-3 in. long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. wide. .... 5. *A. sentis*

EE. Stipules not as above.

F. Length of phyllodia 2 in. or less.

G. Racemes much exceeding the phyllodia, these at least half as broad as long.

H. Phyllodia pubescent. .... 6. *A. podalyriæfolia*

HH. Phyllodia glabrous.

I. Shape of phyllodia obliquely ovate; longitudinal veins 1. .... 7. *A. cultriformis*

II. Shape of phyllodia broadly semi-ovate; longitudinal veins 2. .... 8. *A. praviissima*

GG. Racemes not or only slightly exceeding phyllodia (except in *A. linifolia* var. *prominens*), these several times as long as broad. .... 9. *A. linifolia*

FF. Length of phyllodia over 2 in.

G. Width of some of the phyllodia over 1 in.

H. Shape of phyllodia sickle-shaped, blunt at apex. .... 10. *A. pycnantha*

HH. Shape of phyllodia not sickle-shaped, mostly sharp at apex.

I. Phyllodia bluish-tinged. .... 11. *A. cyanophylla*

II. Phyllodia green. .... 12. *A. saligna*

GG. Width of all the phyllodia under 1 in. .... 13. *A. nervifolia*

DD. Longitudinal veins of phyllodia several (rarely only 2).

E. Pod with narrow wing. .... 14. *A. pendula*

EE. Pod not winged.

F. Fl.-heads in racemes: seeds longitudinal. .... 15. *A. melanoxydon*

FF. Fl.-heads solitary or in pairs, or sometimes in short racemes: seeds transverse. .... 16. *A. cyclops*

- BB. Fls. in narrow spikes.  
 c. Phyllodia narrow ( $\frac{1}{2}$  to about  $\frac{1}{2}$  in.), pungent-pointed..... 17. *A. verticillata*  
 cc. Phyllodia broader (except in *A. longifolia* var. *floribunda*), less rigid, not pungent-pointed.  
 d. Width of phyllodia  $\frac{1}{4}$ – $\frac{1}{2}$  in..... 18. *A. longifolia*  
 dd. Width of phyllodia  $1\frac{1}{2}$ –2 in..... 19. *A. latifolia*  
 AA. Lvs. all bipinnate.  
 B. Fls. in globose heads.  
 c. Plants unarmed.  
 d. Pinnæ few, 2–10 pairs.  
 e. Rachis hirsute..... 20. *A. pubescens*  
 ee. Rachis not hirsute.  
 f. Lfts.  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. long..... 21. *A. elata*  
 ff. Lfts. less than  $1\frac{1}{4}$  in. long.  
 g. Length of pinnæ 1 in..... 22. *A. Baileyana*  
 gg. Length of pinnæ over 1 in..... 23. *A. pruinosa*  
 dd. Pinnæ many, 8–25 pairs..... 24. *A. decurrens*  
 cc. Plants spinose.  
 d. Pinnæ 1 pair..... 25. *A. pulchella*  
 dd. Pinnæ more than 1 pair..... 26. *A. Farnesiana*  
 BB. Fls. in spikes..... 27. *A. Drummondii*

1. *A. juniperina*, Willd. A stiff shrub 8–12 ft., with branchlets pubescent or glabrous: lvs. reduced to phyllodia which are numerous, scattered,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, 1-nerved, linear-subulate, sharp-pointed; stipules spinescent: fls. heads yellow, solitary, on peduncles longer than the phyllodia; fls. 5-merous, the petals ciliate and acute with a prominent midrib: fr. more or less falcate, flat, 1–2 in. long, about  $\frac{1}{2}$  in. broad, usually contracted between the seeds; seeds longitudinal, the funicle but little folded and filiform to the end. Late spring and early summer.

2. *A. tenuifolia*, F. Muell. An everblooming shrub having a honey-like odor and with a sticky exudation on sts. and over the young fl.-buds: branchlets slender and drooping: phyllodia 1-nerved,  $\frac{3}{4}$ –1 in. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. wide, linear-subulate, ending in a sharp point, with a large gland at base: heads of 30 or more lemon-yellow fls., solitary in the axils of the phyllodia, on peduncles  $\frac{1}{4}$  in. long; fls. 4-merous: fr. straight, 2–3 in. long, nearly  $\frac{1}{4}$  in. wide, slightly constricted between the seeds, pointed at both ends and bearing 2 rough longitudinal ridges over the seed; funicle silvery-white, half as long as the oblong seed and enlarged into a cup-shaped aril over one end; ripe June–Nov.

3. *A. calamifolia*, Sweet. BROOM WATTLE. A tall shrub or small tree with slender erect branches: phyllodia  $1\frac{1}{2}$ – $2\frac{1}{4}$  in. long,  $\frac{1}{4}$  in. wide, 1-nerved, narrowly linear, tapering at base, the slender innocuous tip downward-curved, the gland at base less conspicuous than in No. 2 (obscure in dried specimens): racemes short, of 3–4 yellowish heads or reduced to a single one, the peduncles  $\frac{1}{4}$  in. long; fls. 5-merous, about 20 to a head, blooming in early spring; sepals half as long as petals: fr. a rich brown,  $1\frac{1}{4}$ –3 in. long,  $\frac{1}{4}$  in. wide, slightly contracted between the seeds; funicle red, almost encircling the seed in a double fold, ending in a silvery club-shaped aril; ripe Aug.

4. *A. armata*, R. Br. KANGAROO-THORN. Spreading shrub 8–10 ft. wide, 7–11 ft. high, with pendent finger-like branchlets: phyllodia not over 1 in. long, half-ovate, the straight edge hugging the st., the outer edge more or less undulate; nerve excentric, ending in a short pungent point; stipules reduced to slender spines about  $\frac{1}{4}$  in. long: fl.-heads yellow, solitary, on peduncles  $\frac{1}{2}$ – $\frac{3}{4}$  in. long; fls. blooming in early spring, 5-merous, the sepals more than one-half as long as corolla: fr. hairy, straight or slightly curled,  $1\frac{1}{2}$ –2 in. long,  $\frac{1}{4}$  in. wide, in clusters of 2–5 or reduced to 1; funicle silvery, as long as the seed and enlarged to a cup-shaped aril; ripe Aug.—There is a form with larger lvs. and fls., fissured bark and more straggling habit; plant more tender.

5. *A. Sentis*, F. Muell. A rigid shrub or small tree 30–40 ft. high, with terete branchlets, glabrous or pubescent: phyllodia various, lanceolate-oblong with a short point or linear with a hooked point, with 1 central nerve or rarely 2-nerved, in some specimens  $\frac{3}{4}$  in. long by  $\frac{1}{6}$ – $\frac{1}{4}$  in. wide, in others 2 in. long and  $\frac{1}{4}$  in. broad; marginal gland near base or wanting; stipules reduced to spines or occasionally none: heads usually solitary or in pairs, 20–30-fl.; sepals ciliate: fr. flat, 2–3 in. long,  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad; seeds nearly oblique, the funicle gradually thickened and folded several times, fitting against the seed like a cap. (*Sentis*: thorn-bush, from the Latin.)

6. *A. podalyriæfolia*, Cunn. A tall shrub with conspicuous glaucous gray branchlets covered with soft pubescence: phyllodia penninerved, pubescent (rarely glabrous), very glaucous, ovate or oblong, 1– $1\frac{1}{2}$  in. long,  $\frac{1}{2}$ – $1\frac{1}{4}$  in. wide,

with excentric midrib, obliquely apiculate; gland at or near the middle of the margin nearest the midrib: heads numerous, yellow, in simple racemes longer than the phyllodia; calyx not half as long as corolla; petals pubescent, with prominent midrib: fr. flat, glabrous or pubescent, 1-3 or more in. long,  $\frac{3}{4}$  in. broad; seeds longitudinal, funicle not encircling seed but in short folds at hilum end, the last fold slightly thickened.

7. *A. cultriformis*, Cunn. Tall shrub with gray glaucous glabrous foliage thickly clothing the branches: phyllodia obliquely ovate to almost triangular,  $\frac{1}{2}$ -1 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. wide, mucronate-tipped; midvein excentric, curved; gland about one-third the distance from the base on the margin farthest from midrib: heads yellow, many in axillary racemes much longer than the phyllodia: fr. a rich brown,  $1\frac{1}{2}$ -3 in. long,  $\frac{1}{4}$  in. wide, flat, occasionally constricted between the seeds, the margins somewhat thickened; seed oblong, longitudinal; funicle half as long as seed, silvery and enlarged into a cup-shaped aril almost from the beginning; ripe Sept., Oct. Fls. early spring.—Often pruned and used as a hedge.

8. *A. pravissima*, F. Muell. Small tree 15-20 ft. high, with pendulous finger-like branchlets thickly clothed with short phyllodia whose decurrent bases form prominent ridges: phyllodia  $\frac{1}{4}$ -1 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. wide, very broadly semi-ovate, strongly mucronate-tipped, indistinctly 2-nerved, the prominent nerve strongly excentric; gland large, near the base of the margin farthest from the prominent nerve: heads yellow, very small, numerous in racemes much longer than the phyllodia: fr. when ripe once or twice twisted,  $1\frac{1}{2}$ -2 $\frac{3}{4}$  in. long,  $\frac{1}{4}$  in. wide; seed small, longitudinal, with prominent central marking; funicle as long as seed, enlarged into a club-shaped aril; ripe July, Aug. Fls. early spring.

9. *A. linifolia*, Willd. A tall shrub, minutely pubescent on the branchlets and at base of the young phyllodia: phyllodia linear on young shoots to linear-lanceolate on more mature ones,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long,  $\frac{1}{8}$ - $\frac{1}{2}$  in. wide, 1-nerved, mucronate; gland small, below the middle of the lf.: heads 8-12-fld., in racemes mostly shorter than the phyllodia: fr. flat, 2 $\frac{1}{2}$ -4 in. long,  $\frac{3}{8}$  in. wide; funicle half as long as seed, with club-shaped aril. Early spring.—Var. *prominens*, Moore (*A. prominens*, Cunn.), has wider phyllodia with prominent gland varying in position, and broader fr.

10. *A. pycnantha*, Benth. GOLDEN WATTLE. BROAD-LEAVED WATTLE. Small tree with more or less pendulous branchlets: phyllodia penninerved, falcate and oblong-lanceolate to lanceolate or even broadly obovate, blunt at apex, 2 $\frac{1}{2}$ -6 in. long,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. wide (seedling lvs. sometimes 4 in. wide and 5 in. long), 1-nerved, the nerve more or less excentric; gland  $\frac{1}{2}$ - $\frac{3}{4}$  in. from base: racemes simple or compound, fragrant and showy, often bending the tree with their weight of bloom; heads yellow, 50-60-fld., the peduncles  $\frac{1}{8}$  in. long; sepals 5, ciliate, almost as long as petals: fr. 2-5 in. long,  $\frac{1}{4}$  in. wide, contracted and slightly constricted between the seeds; funicle whitish, club-shaped, half as long as seed, not folded or occasionally folded and transverse to the seed; ripe Aug. Fls. early spring.

11. *A. cyanophylla*, Lindl. BLUE-LEAVED WATTLE. Glabrous shrub 18 ft. high, stoloniferous, with drooping angled branches: lower phyllodia about 12 in. long, the upper 6 in. or less, narrower, linear-oblong to lanceolate, much narrowed toward base, sharp at tip: fl.-heads golden-yellow, about  $\frac{1}{4}$  in. diam., on peduncles  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, 3-5 in axillary racemes much shorter than the phyllodia. Early spring.

12. *A. saligna*, Wendl. (*A. leiophylla*, Benth.). Low tree or tall shrub with angular rather drooping branches: phyllodia lanceolate to linear-lanceolate or even oblanceolate, acute to obtuse, narrowed to base, with or without gland at base, 1-1 $\frac{1}{4}$  or even 1 $\frac{3}{4}$  in. wide, 3-8 $\frac{1}{2}$  in. or the lower lvs. 1 ft. long; longitudinal nerve 1, often excentric; heads globose,  $\frac{1}{2}$  in. diam., in large terminal racemes or reduced to 4-5 axillary heads strung along for 2-3 ft.; peduncles  $\frac{1}{4}$ - $\frac{1}{2}$  in. long; fr. 3-5 in. long,  $\frac{1}{4}$  in. wide, constricted between the seeds, flat with nerve-like margins; funicle club-shaped, three-fourths as long as seed. Mostly in spring; fr. ripe late summer.

13. *A. neriifolia*, Cunn. Small tree with slender angled branchlets: phyllodia oblanceolate, acute or apiculate,  $1\frac{1}{2}$ -5 $\frac{1}{4}$  in. long,  $\frac{1}{4}$ - $\frac{3}{8}$  in. wide, with a prominent central nerve; gland near base of upper margin: heads in simple or branching racemes shorter than the phyllodia; fls. 5-merous, about 40 in a head: fr. contracted and often constricted between the seeds, 3-6 in. long,  $\frac{5}{8}$  in. wide; seeds longitudinal, oval, with central depression; funicle white, short, not encircling seed, but thickened into a club-shaped aril. July.

14. *A. pendula*, Cunn. WEEPING MYALL. Small tree with gray foliage and pendulous branchlets: phyllodia linear-lanceolate, often falcate, oblique-mucronate,

2-3½ in. long, ¼-½ in. wide, minutely pubescent, obscurely 3-5-veined; gland less than ¼ in. from base: heads in pairs or clusters, about 30-fl.: fr. 2-3 in. long, ½ in. wide, each suture narrowly winged.

15. *A. melanoxylon*, R. Br. BLACKWOOD ACACIA. A good-sized evergreen tree of pyramidal form and with dense foliage: bipinnate lf.-blades sometimes present; phyllodia acute, oblanceolate to lanceolate, with one margin more strongly curved than the other, 2½-4½ in. long, ¾ in. wide, with 3-6 longitudinal veins; gland near base of phyllodia: heads cream-color, 40-50-fl., in axillary racemes shorter than the phyllodia: fr. reddish-brown, more or less curved and twisted into shape of letter C or S, 3-5 in. long, ¾ in. wide; seed longitudinal, ½ in. long, encircled in double fold by the long red funicle which is very characteristic of the species; fr. ripe July-Nov., the seed remaining on the tree for months. Fls. early spring.

16. *A. cyclops*, Cunn. Spreading shrub 8-10 ft. high: phyllodia narrow-oblong to lanceolate or falcate-lanceolate, with oblique point, 1½-3½ in. long, ¼-¾ in. wide, with gland at base more or less obscure, longitudinal veins 3-6: fl.-heads solitary or in spikes or even in short racemes, on peduncles ¼ in. long: fr. 2-2½ in. long, ¾ in. wide, more or less curled, in clusters of 2-7 from one head, rich brown at first but becoming ragged and black; seeds transverse, black, surrounded (or nearly so) by the scarlet funicle in double fold. Fls. July-Dec.; fr. Aug. Australia.

17. *A. verticillata*, Willd. WHORL-LEAVED ACACIA. Spreading shrub or small tree of graceful habit; branches more or less pubescent: phyllodia in whorls or often scattered, linear-subulate, 1-nerved, about ½-¾ in. long or more, ⅙-⅓ in. wide, ending in a pungent point; gland occasionally present near the middle: fls. yellow, in spikes ½-1 in. long, often concealing the phyllodia: fr. flat, straight or slightly curved, 2-3 in. long, ½ in. wide; seeds longitudinal, ¼ in. long, with light-colored funicle of about same length thickened at end of seed into a cup-shaped aril; ripe June and early July. Fls. Mar., Apr.—There are several types, some soft to the touch, others harsh and rigid.

18. *A. longifolia*, Willd. SYDNEY GOLDEN WATTLE. Tall shrub or small tree, glabrous or the branchlets slightly pubescent: phyllodia oblong-lanceolate or oblanceolate, narrowed at base, acute or obtuse, 2-3 or even 4-6 in. long, ¼-½ in. wide, with 3-4 longitudinal nerves; gland near base: fls. bright yellow, 4-merous, in axillary spikes ¾-2¼ in. long: fr. 1½-5 in. long, ½ in. broad, terete until fully ripe when the valves flatten and separate, becoming dark and curled and persisting on the tree; seeds longitudinal, plump, black and shining; funicle silvery, bent upon itself several times, dilated and fitted like a cap over one end of the seed; ripe Aug., Sept. Fls. early spring.—Var. *floribunda*, F. Muell. Foliage all at ends of branches, giving the plant a thin delicate appearance; phyllodia linear-lanceolate, acuminate, tipped with an oblique point: fls. whitish-yellow, in spikes 1½ in. long: fr. contracted and long-constricted between the seeds; funicle folded like a cap: ripe July, Aug. Fls. early spring. Differing greatly from type in its extreme form but all variations between the two exist. A second var. has shorter phyllodia with rounded apex, and fls. in shorter spikes blooming and fruiting later than the type.

19. *A. latifolia*, Benth. Glabrous and glaucous; branchlets with 2-3 raised acute or almost winged angles: phyllodia obliquely ovate-rhomboid or falcate, 3-6 in. long, 1½-2 in. broad, 3-5-nerved: spikes pedunculate, loose, 1-2 in. long; fls. mostly 4-merous: fr. shortly stipitate, 2-4 in. long, nearly ¼ in. broad; seeds oblong, longitudinal, funicle scarcely folded, thickened into an oblique lateral aril.—It is doubtful whether all the plants in cult. under this name belong to this species. Some of them may be *A. longifolia* or forms of it.

20. *A. pubescens*, R. Br. HAIRY WATTLE. Shrub with drooping hirsute branchlets and hirsute petioles and rachis: lvs. all bipinnate, the 3-10 pairs of pinnæ ½-¾ in. long; lfts. 6-20 pairs (mostly 16), crowded, linear, glabrous, ⅙-⅓ in. wide: fls. yellow, in heads of 15-20 each, these many in simple axillary long-peduncled racemes longer than the lvs.; calyx short, sinuate-toothed; corolla protruding in bud, the petals united: fr. flat; seeds longitudinal, last fold of funicle forming a short lateral or oblique aril, with very small folds below it.

21. *A. elata*, Cunn. Tree 50-60 ft. high, with dark green foliage and young shoots yellow-pubescent: lvs. 1 ft. long, 8-10 in. wide, twice compound; pinnæ 2-6 pairs, 5-7 in. long; pinnules 8-13 pairs, lanceolate, acuminate, pubescent, 1¼-1½ in. long, ¼-¾ in. wide, about ¾ in. apart: heads about 40-fl., in compound racemes; sepals 5, united, half as long as the petals: fr. a rich brown, 3½-6 in. long, ¾ in. wide, with nerve-like margins; seed lenticular, with club-shaped aril half as long. Fls. autumn and winter; fr. late summer.



22. *A. Baileyana*, F. Muell. An attractive shrub or small tree, glabrous, usually with gray glaucous foliage arranged spirally around the branchlets and nearly concealing them: lvs. bipinnate, 1-2 in. long, with gland at base of each pair of pinnae; pinnae 2-3 pairs (occasionally 4), 1 in. long; lfts. about 20 pairs, about  $\frac{1}{4}$  in. long; fls. 15 in a head, on peduncles  $\frac{1}{8}$ - $\frac{1}{4}$  in. long, the heads globose, numerous, in simple axillary racemes longer than the lvs. or the racemes paniculately branched and terminal: fr.  $1\frac{1}{2}$ -4 in. long,  $\frac{1}{2}$  in. wide, flat, occasionally constricted between the seeds, glaucous; seeds transverse,  $\frac{1}{4}$  in. long, with club-shaped funicle one-half as long; ripe July, Aug. Fls. latter part of winter. (Named after the late F. M. Bailey, colonial botanist of Queensland.)

23. *A. pruinosa*, Cunn. Small tree with bronze-colored young foliage: pinnae 2-4 pairs,  $2\frac{1}{2}$ -4 in. long; pinnules 11-24 pairs,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, oblong to linear with excentric main nerve and occasionally 1 or 2 short nerves; gland prominent, distant from base of pinnule; heads 30-fld., racemed; fls. 5-merous: fr.  $2\frac{1}{2}$ -3 in. long,  $\frac{3}{8}$  in. broad, sometimes constricted between the seeds, the margins nerve-like; funicle short, filiform for half its length then enlarged into a club-shaped aril. Fls. Feb.-Apr.

24. *A. decurrens*, Willd. GREEN WATTLE. Handsome tree, glabrous or more or less tomentose-pubescent, with branches usually prominently angled: lvs. bipinnate, the pinnae 8-15 pairs or more (sometimes reduced to 5 or 6); lfts. 30-40 pairs or more, linear,  $\frac{1}{6}$ - $\frac{1}{2}$  in. long; heads 20 30-fld., the fls. yellow, mostly 5-merous: fr. 3-4 in. long, more or less contracted between the seeds.—Var. *mollis*, Lindl. (*A. molissima*, Willd.). BLACK WATTLE. Tree 20-50 ft. high, with reddish bark showing under the fissures: pinnae 8-20 pairs, 2-6 in. long, shining above; pinnules 30-60 pairs, crowded, not  $\frac{1}{8}$  in. long; gland between each pair of pinnae and often on the internodes between: heads globose, small, pale yellow, in panicked racemes, the fls. 5-merous, mostly in June: fr. dark, pubescent, 2-4 in. long, not  $\frac{1}{4}$  in. wide, constricted and contracted between the seeds; seeds longitudinal, ripe June-Oct. Var. *dealbata*, F. Muell. Tree 50 ft. or more high, with smooth bark and gray pubescent branchlets: lvs. silvery-gray to light green, 3-6  $\frac{1}{2}$  in. long, with 13-25 pairs of pinnae; lfts. 30-40 pairs; one gland between each pair of pinnae; heads of 30 5-merous deep yellow fls. in simple or often compound racemes; peduncles  $\frac{1}{4}$  in. long; sepals united: fr.  $1\frac{1}{2}$ -4  $\frac{1}{2}$  in. long,  $\frac{3}{8}$ - $\frac{1}{2}$  in. wide, glabrous, rich brown; seeds longitudinal, funicle ending in a silvery club-shaped aril; ripe July, Aug. Fls. early spring. Intermediate forms between this and the species.

25. *A. pulchella*, R. Br. Glabrous or hirsute shrub, with slender branches mostly armed with subulate spines: lvs. bipinnate with 1 pair of pinnae; stipules spinescent; lfts. 4-7 pairs, obovate-oblong,  $\frac{1}{2}$ - $\frac{1}{4}$  in. long; gland stipitate between the pinnae; or none: heads yellow, solitary, on slender peduncles  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; fls. 5-merous; calyx half as long as petals and sinuate-toothed: fr. flat, thick-margined, 1-2 in. long,  $\frac{1}{6}$ - $\frac{1}{4}$  in. wide; seed longitudinal, funicle filiform and thickened into a club-shaped aril. Apr.—There is a glabrous var. with larger and more numerous lfts. and another hirsute, white-fld., with narrow revolute lfts.

26. *A. Farnesiana*, Willd. (*Vachellia Farnesiana*, Wight & Arn.). POPINAC. OPOANAX. CASSIE. HUISACHE. Much-branching shrub 6-10 ft. high, with straight spines; stipules of some or all the lvs. persistent and spinescent: lvs. bipinnate, the pinnae 5-8 pairs; lfts. mostly 10-25 pairs, glabrous, linear,  $\frac{1}{2}$ - $\frac{1}{6}$  in. long; fls. deep yellow, very fragrant, in large heads, these 2-3 in the older axils, on pubescent peduncles  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; fr. cylindric,  $1\frac{1}{2}$ -3 in. long, scarcely dehiscent, filled with a pith which separates the seeds from each other. Feb., Mar. (*Farnesiana*: grown in early times in the Farnesian garden, Rome.) Tex., Mex., Asia, Afr., and Australia.—Probably of American origin, but now naturalized in all trop. countries.

27. *A. Drummondii*, Benth. Bush or small tree: pinnae 2-4 pairs, each with 4-10 linear, very obtuse, glabrous lfts.: fls. pale lemon-yellow, in dense, solitary, drooping spikes 1-1  $\frac{1}{2}$  in. long; fr. glabrous or pubescent, flat, with thickened margins, not exceeding 1 in. long,  $\frac{1}{4}$  in. broad; seeds transverse, funicle short, thickened into a small aril of about 2 folds under seed. (Named for James Drummond, Australian botanist.)

69. **CALLIANDRA**, Benth. Shrubs or trees planted out-of-doors in the far S. or in the greenhouse N.; about 120 species, widely distributed in the tropics.—Plants mostly unarmed: lvs. bipinnate, with numerous lfts.; fls. purplish-red or white, usually in globose heads or clusters; calyx toothed or deeply cleft; corolla small, obscured by the numerous long silky purple or

white stamens: fr. straight or somewhat curled, usually compressed, with thickened margin (in this differing from *Albizzia*), dehiscent. (*Calliandra*: Greek *beautiful stamens*.)

|   |                            |
|---|----------------------------|
| Filaments white.....                      | 1. <i>C. portoricensis</i> |
| Filaments purple.....                     |                            |
| Stipules scale-like.....                  | 2. <i>C. Tweedii</i>       |
| Stipules represented by a weak spine..... | 3. <i>C. californica</i>   |

1. *C. portoricensis*, Benth. Unarmed shrub or small tree with pubescent branchlets: pinnae in 2-4 pairs; lfts. in 10-25 pairs, linear, obtuse, closing at evening: heads globose, axillary, on peduncles longer than the lvs. and usually 3 together; fls. white, opening as the lvs. close; calyx ciliate on the margin; stamens 20-25, with long white filaments: fr. straight, linear, tapering at base. W. Indies.

2. *C. Tweedii*, Benth. Unarmed shrub, lightly hairy: stipules scale-like; pinnae in 3-4 pairs; lfts. in 20-30 pairs, linear, obtuse, shining: peduncles axillary, 1-2 in. long, from large scaly buds; calyx and corolla silky, the lobes erect; stamens long, numerous, purple. (Bears the name of James Tweedie, 1775-1862, English botanist who collected in Brazil.) Brazil.

3. *C. californica*, Benth. Stiff hairy much-branched shrub about 4 ft. high: stipules represented by weak slender spines  $\frac{1}{4}$ - $\frac{1}{2}$  in. long; rachis terminated by a small thorn; pinnae 7-8 pairs, each with numerous oblong lfts.: heads on axillary peduncles shorter than the lvs.; stamens purple, long-exserted, nearly 1 in. long. Lower Calif.

70. *PITHECOLOBIUM*, Mart. About 125 species of shrubs or trees especially numerous in trop. Amer. and Asia, a few in trop. Afr. and Australia, a few planted for ornament and shade far S.—Unarmed or with stipular or axillary spines: lvs. bipinnate; pinnae with few to many pairs of lfts., rarely with only 1 lft.: peduncles solitary or clustered, axillary or the clusters at the ends of the branches; fls. commonly white, in globose heads or more rarely in oblong or cylindric spikes, 5-6-merous, bisexual or rarely polygamous; calyx shortly toothed; stamens few or many, much exserted, united into a tube; ovary sessile or stalked: fr. compressed, circinate or variously twisted or rarely nearly straight, dehiscent or indehiscent or separating into joints; seeds compressed, often fleshy, funicle filiform or expanded to form a fleshy aril. (*Pithecolobium*: Greek *monkey* and *ear-ring*, alluding to the circular pods.)

*P. dulce*, Benth. GUAYMOCHIL. HUAMUCHIL. MANILA TAMARIND. Large stately tree to 50 ft.: stipules reduced to short spines; lvs. and lfts. 1-pinnate; lfts. obovate or oblong, about 1 in. long, obtuse, very oblique: heads short-peduncled, the upper paniculate-racemose; fls. white, finely pubescent, the calyx  $\frac{1}{2}$ , the corolla  $\frac{1}{4}$  in. long; fr. spirally twisted, 5-6 in. long,  $\frac{1}{8}$ - $\frac{1}{2}$  in. broad; seeds shining black, flat and irregularly triangular, the funicle dilated at apex into a fleshy aril. Mex., Philippines.—Differs from *P. Unguis-cati*, Benth. (Cats-Claw), in being a large tree (the latter a shrub or small tree), also in the creamy-white corolla being half as long, and the infl. covered with whitish tomentum instead of glabrous.

71. *SAMANEA*, Merr. Trees or shrubs of the American tropics, where one or two are much planted for shade; about 30 species.—Spineless or rarely spiny: lvs. with several to many pairs of pinnae; pinnae with 1 to many pairs of lfts.: fls. in globose heads, these axillary or variously clustered at the ends of the branches: fr. straight or nearly so, rigid, more or less constricted, flat or more or less thickened, usually indehiscent, septate between the seeds. (*Saman-ea*: a corruption of its native Spanish name, *Zaman*.)

*S. Saman*, Merr. (*Pithecolobium Saman*, Benth.). RAIN-TREE. ZAMAN. SAMAN. Flat-topped tree with a spread often of 100 ft. and 60-80 ft. high, the branchlets velvety-pubescent: lvs. 2-4-pinnate; lfts. 2-8-pinnate, oblique, ovate-oblong or suborbicular, to  $1\frac{1}{2}$  in. long, shining above, pubescent beneath; glands between the pinnae and between the lfts.: peduncles 2- $3\frac{1}{2}$  in. long; fls. in short-pedicelled heads, more or less tomentose; calyx  $\frac{1}{4}$  in. long; corolla  $\frac{1}{2}$  in. long, yellowish; stamens 20, light crimson, three times as long as the corolla: fr. sessile, straight, thick-margined, indehiscent, 6-8 in. long,  $\frac{1}{2}$ -1 in. wide; seeds to 25, surrounded by pulp. Cent. Amer. and W. Indies and now widely distributed through the tropics.

72. **ALBIZZIA**, Durazz. Twenty-five species or more of unarmed trees or shrubs in trop. and subtrop. regions of Asia, Afr., and Australia, 1 in Mex., planted for ornament far S. and some also valuable timber trees.—Lvs. alternate, usually deciduous, bipinnate; lfts. mostly small and numerous, oblique: fls. yellowish, white or pink, mostly 5-merous, in globose heads or cylindric spikes which are axillary or paniculately arranged at the ends of the branches; calyx toothed or shortly lobed; corolla-segms. connate to above the middle; stamens numerous, more or less connate at base, exserted: fr. a large strap-shaped non-septate pod without pulp. (Albiz-zia: after Albizzi, an Italian naturalist.)

Fls. in cylindric axillary spikes: lvs. somewhat persistent.....1. *A. lophantha*

Fls. in globose heads: lvs. deciduous.

Lfts. ovate or oblong, obtuse.....2. *A. Lebbeck*

Lfts. falcate, with midrib close to the upper margin, acute.....3. *A. Julibrissin*

1. **A. lophantha**, Benth. (*Acacia lophantha*, Willd.). Shrub or small tree 6-20 ft. high: lvs. with 14-24 pinnæ; lfts. 40-60, linear-oblong, obtuse, about  $\frac{1}{2}$  in. long: spikes mostly 2, about 2 in. long, yellowish; fls. distinctly pedicelled. Early spring. S. W. Australia.

2. **A. Lebbeck**, Benth. (*Acacia Lebbeck*, Willd.). **LEBBEK-TREE**. **SIRIS-TREE**. **WOMANS-TONGUE-TREE**. Large tree: lvs. large, with 4-8 pinnæ; pinnæ with 10-18 oblique oblong or obovate nearly sessile segms. 1-1½ in. long: fls. greenish-yellow, in short-peduncled axillary globose heads, 3-4 together; stamens exserted about 1 in.: fr.  $\frac{1}{2}$ -1 ft. long, about 1½ in. wide. (Lebbeek: Arabic name.) Trop. Asia, N. Australia; naturalized in W. Indies.

3. **A. Julibrissin**, Durazz. (*Acacia Julibrissin*, Willd.). Tree attaining 40 ft.: rachis of lf. with a small gland near base; pinnæ 8-24, with numerous, oblique, falcate-oblong, apiculate segms.  $\frac{1}{4}$  in. long, these with midrib close to the upper edge: heads pink, slender-peduncled, crowded at the upper end of the branches; stamens exserted about 1 in.: fr. 3-6 in. long, under 1 in. wide. Summer. (Julibrissin: Persian name.) Warmer temp. Asia from Persia to Japan.—There is a smaller var. with bright pink fls.

## 78. GERANIACEÆ. GERANIUM FAMILY

Herbs annual and perennial, with a few kinds woody, of 11 genera according to the latest monographer and about 640 species, widely distributed in temp. and subtrop. regions; the cult. kinds are grown mostly for ornament.—Lvs. opposite or alternate, simple or compound, usually stipulate: fls. bisexual and mostly regular; sepals prevailingly 5 and distinct; petals also typically 5, hypogynous or nearly so, usually imbricate; stamens 5, or two to three times the number of the petals, some of them frequently sterile, filaments commonly more or less connate at base; pistil 1, 3-5-lobed, the carpels joined and produced into a style, ovules 1-2 in each cell: fr. dry, lobed, 1-seeded in each carpel, dehiscent from the base and joined by the styles. *G*, *H*, Fig. 10, page 387.

Fls. without spur.

Stamens 10, usually all bearing anthers.....1. **GERANIUM**

Stamens 10, the outer ones without anthers.....2. **ERODIUM**

Fls. with spur, which is adnate to pedicel (discovered when the pedicel is sectioned); stamens 10.....3. **PELARGONIUM**

1. **GERANIUM**, L. **GERANIUM**. **CRANESBILL**. About 260 species, in the temp. regions around the world, some of them annual and weeds, a few of the perennials grown in the herbaceous garden.—Low usually diffuse plants with forking sts.: lvs. mostly orbicular to reniform, variously palmately lobed or dissected, the radical ones long-peduncled: fls. regular, without spur, the 5 petals imbricate and hypogynous; stamens 10, usually antheriferous: fr. comprised of turgid carpels mostly permanently attached to the styles. (Gera-nium: from the Greek word for *crane*, because of the beak-like fr.)—

*G. maculatum*, L., the common wild geranium or cranesbill is sometimes transferred to grounds.

- Peduncle usually 1-fl'd.....1. *G. sanguineum*  
 Peduncle more than 1-fl'd.  
 Pedicel recurved under the fr.....2. *G. pratense*  
 Pedicel erect under the fr.  
 Corolla purple-blue with dark purple center.....3. *G. psilostemon*  
 Corolla purple or violet-blue, but without dark spot-center.  
 Lvs. parted three-quarters or more to base: pedicels glandless  
 or nearly so.....4. *G. ibericum*  
 Lvs. parted two-thirds to base: pedicels densely glandular... 5. *G. platypetalum*

1. *G. sanguineum*, L. Common perennial border plant with cord-like roots, 15-20 in. high, much branched and very leafy, with scattered spreading white glandless hairs: lvs. circular in outline, 1 to about  $2\frac{1}{2}$  in. across, parted into 5-7 narrow nearly blunt lobed lobes: fls.  $1-1\frac{1}{2}$  in. across, purple or bluish-purple, single on slender peduncles 3-6 in. long that are bracted above the middle; petals obovate or obovate, much exceeding the short-awned sepals: fr. pilose. Eurasia.—Var. *prostratum*, Pers. (*G. lancastricense*, With.), is a dwarfer, more compact form, fls. lighter colored.

2. *G. pratense*, L. Perennial, 1-3 ft., hairy-pubescent, glandular above: lvs. large, 3-6 in. across, 7-divided into cut and dentate sharp lobes: fls. usually 2 on each developed peduncle, purple,  $1\frac{1}{4}-1\frac{1}{2}$  in. across; pedicel glandular; petals obovate, sometimes slightly notched, considerably exceeding the slender-awned sepals: fr. glandular-hairy, deflexed. Eurasia.

3. *G. psilostemon*, Ledeb. (*G. armenum*, Boiss.). Perennial, with few or solitary sts. 1-2 ft. high, much forked above, adpressed-hairy: lvs. reniform-orbicular, deeply 5-parted, the acute or incised-dentate lobes more or less rhomboid: fls. purple-blue to crimson, about  $1\frac{1}{2}$  in. across, the obovate obtuse petals with dark spot at base; sepals awned: fr. ciliate on the back, erect on glandular pedicels. Armenia.

4. *G. ibericum*, Cav. Perennial from a strong rhizome; sts. several, stout, erect, branched above,  $1\frac{1}{2}$  ft.: basal lvs. few, long-petioled; blade angular-orbiculate, 2-6 in. across, lobed nearly to the base, the lobes obovate or obovate-rhomboid and coarsely pinnatifid: fls. about 2 on a non-glandular peduncle, purple or purple-blue, without a dark center, about  $1\frac{1}{2}$  in. across; petals broad-obovate, emarginate, twice longer than the hairy ovate sepals: fr. erect, glandular-hairy. S. W. Asia.

5. *G. platypetalum*, Fisch. & Mey. (*G. ibericum* var. *platypetalum*, Boiss.). Differs from No. 4 in being mostly lower and more pubescent, the lvs. not so deeply cut and lobes less pointed, pedicels glandular-pubescent, fls. violet-blue. S. W. Asia.

2. **ERODIUM**, L'Her. HERONSBILL. About 60 wide-spread species in temp. and semitrop. regions, mostly low herbs, annual or perennial, differing from Geranium in bearing pinnate or pinnately lobed lvs., only 5 antheriferous stamens, carpel-bodies slender or spindle-shaped, styles coiled at maturity. Aside from two or three agricultural kinds, the species are little known in cult. (*Ero-dium*, Greek *heron's bill*.)

- Lvs. pinnate, with pinnatifid lfts.  
 Sepals terminated with 1 or 2 bristle-like hairs.....1. *E. cicutarium*  
 Sepals without terminal hairs.....2. *E. moschatum*  
 Lvs. not compound, pinnately lobed or pinnatifid.....3. *E. Botrys*

1. *E. cicutarium*, L'Her. ALFILARIA. RED-STEM FILAREE. Annual, 6-18 in. and much branched, soft-hairy and commonly red-stemmed, somewhat grown for hay W. and S. W., and utilized as wild pasture, it having been extensively naturalized from Eu.: basal lvs. forming rosette 8-12 in. across where it grows as winter annual; pinnæ 6-12 or more, sessile, small, oblong or ovate-oblong, pinnatifid into obtuse or acute narrow lobes: fls. purple or pink, about  $\frac{1}{2}$  in. across, the entire ciliate-clawed petals equalled or exceeded by the sharp sepals that are tipped by 1 or 2 bristle-like more or less deciduous white hairs: fr. hairy,  $1-1\frac{1}{2}$  in. long with the slender styles.—Widely variable.

2. *E. moschatum*, L'Her. WHITE-STEM FILAREE. MUSK-CLOVER. Hirsute annual known somewhat for forage and sometimes grown in the flower-garden: differs from No. 1 in having mostly white sts., less deeply cut lfts., large membranaceous rather than small and acute stipules, sepals not tipped with bristle-like hairs, filaments winged at base and toothed. Extensively naturalized in Calif.; Medit. region and E.



3. **E. Botrys**, Bertol. Prostrate white-pubescent annual sometimes used for forage and naturalized on the Pacific slope: lvs. 1-2 in. long, on long petioles, oblong-ovate, pinnatifid, with serrate acute lobes: fls. violet; sepals tipped with 1 or 2 short bristles; filaments dilated nearly to top. Medit. region.

3. **PELARGONIUM**, L'Her. STORKSBILL. Upwards of 230 perennial herbs and subshrubs, mostly from S. Afr., a number of them much grown for ornament and yielding the "geraniums" of florists.—Plants often succulent: lvs. either digitately or pinnately veined, lobed or dissected, often strong-smelling: fls. of many colors, the calyx with a nectar-spur that is joined to the pedicel; sepals and petals usually 5, the 2 upper petals mostly larger and more prominently colored; stamens 10, somewhat connate at base, part of them without anthers: fr. of 5 valves which usually coil as they dehisce. (Pelargonium: Greek *stork's bill*, from the fr.)—The identity of garden races is in need of new investigation; some of these races are undoubtedly the result of long hybridization and mutation; the cultivars are numerous.

- |  |                            |
|--|----------------------------|
| A. Plant weak and trailing, smooth or nearly so.....   | 1. <i>P. peltatum</i>      |
| AA. Plant erect, variously hairy or pubescent, more or less shrubby at base.   |                            |
| b. Sts. thick and succulent: lvs. orbicular to reniform, shallowly crenate-lobed or -toothed: plant with fishy odor: fls. showy.....   | 2. <i>P. hortorum</i>      |
| BB. Sts. very short, not succulent, from which slender branches arise: lvs. small, crenate-lobed, not crisped, long slender-stalked: plant with sweet odor: fls. very small. |                            |
| c. Fls. distinctly pedicelled.....   | 3. <i>P. odoratissimum</i> |
| cc. Fls. sessile or essentially so.....  | 4. <i>P. fragrans</i>      |
| BBB. Sts. more woody and well developed, not succulent: lvs. sometimes sweet-scented, variously lobed or parted or else sharp-toothed.                                       |                            |
| c. Lvs. angled or only obscurely lobed, with many sharp teeth: fls. large and very showy.....  | 5. <i>P. domesticum</i>    |
| cc. Lvs. lobed along the sides (pinnately), the lobes $\frac{1}{2}$ in. or more broad.....   | 6. <i>P. quercifolium</i>  |
| ccc. Lvs. deeply lobed toward base and ribs mostly converging there (as if digitate).  |                            |
| d. Lobes broad and rounded, close together, about 1 in. across, and not again lobed to any extent.....   | 7. <i>P. vitifolium</i>    |
| dd. Lobes close together, again lobed into parts $\frac{1}{4}$ in. or so broad....   | 8. <i>P. graveolens</i>    |
| ddd. Lobes very narrow and wide apart, so that the lf. has an open skeletonized effect.  |                            |
| e. Rachis and lobes with few teeth.....  | 9. <i>P. Radula</i>        |
| ee. Rachis and lobes with many small teeth.....  | 10. <i>P. denticulatum</i> |
| cccc. Lvs. numerous and small, entire at base, the rounded margin incised and crisped.....   | 11. <i>P. crispum</i>      |

1. **P. peltatum**, Ait. IVY GERANIUM. Plant weak, trailing, drooping or somewhat climbing; sts. 2-3 ft. long, glabrous or very nearly so: lvs. alternate, somewhat succulent, nearly orbicular, the petiole inserted within the margin (blade peltate), 2-3 in. across, shallowly 5-angle-lobed, the margin otherwise entire but ciliate, the stipules large and cordate-triangular: fls. few or several in an umbel terminating a long axillary peduncle, the pedicels pubescent and  $\frac{1}{4}$ - $\frac{1}{2}$  in. long below the spur; corolla rose-carmine, the upper petals blotched and striped, 3 lower petals separated from the others. S. Afr.; an old window-garden plant and also now much modified; often runs to white races.

2. **P. hortorum**, Bailey. FISH GERANIUM. Stout plants with succulent sts. becoming woody when grown in the open (in mild regions) year by year, constituting the common geraniums for windows and bedding, often wintered-over in cellars: herbage with a strong fishy odor, finely pubescent: lvs. orbicular to reniform, 3-5 in. across, somewhat scalloped, more or less crenate-toothed, usually with a broad color-zone inside the margin: fls. many in an involucrate umbel terminating long peduncles from upper axils, the unopened ones deflexed, pedicels  $\frac{1}{4}$  in. or much less long below the very long spur; corolla red, pink, salmon, white, the 3 lower petals larger or all of them nearly equal. Cultigen; probably derived from *P. inquinans* and *P. zonale*, and perhaps others, of S. Afr.; a common pot plant, in many forms and frequent in the open in Calif.

3. **P. odoratissimum**, Ait. APPLE or NUTMEG GERANIUM. Many-stemmed lax lopping finely tomentose-pubescent plant with short woody caudex and many slender branches 12-20 in. long, the herbage pleasantly scented: lvs. very slender-petioled, the blade reniform-cordate or -truncate, about 1 in. across, crenate, thin

in texture; stipules usually connate: fls. few in umbels on peduncles 2-3 in. long, manifestly pedicelled beneath the spur; corolla about  $\frac{1}{4}$  in. long, not wide-spreading, white or whitish: fr. about  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, hairy. S. Afr.; grown for its sweet-smelling herbage.

4. *P. fragrans*, Willd. A strict rather stiff plant, the sts. very leafy, with free stipules: fls. subsessile, the spur very long; corolla whitish, with pink veins. S. Afr.; known for its fragrant herbage, but apparently not common in cult. (see No. 11).

5. *P. domesticum*, Bailey. SHOW or FANCY GERANIUMS or PELARGONIUMS. Erect soft-hairy forking plants, the sts. not succulent: lvs. broadly cordate-ovate to almost reniform, sometimes truncate at base, 2-4 in. across, more or less obscurely angled, the margins with many unequal sharp teeth; stipules scarious, cordate-ovate, prominent: fls. large and very showy, sometimes 2 in. across or more, few or several in an umbel terminating long or short peduncles, the pedicel various beneath the spur; corolla white to pink, wine-red, and crimson, the 2 upper broad petals with brilliant blotches of darker color. Cultigen; apparently descended from several S. African species; grown as pot plants, often as Lady Washington Geraniums.

6. *P. quercifolium*, Ait. OAK-LEAVED GERANIUM. Strong plant to 3 ft., becoming shrubby, pubescent or at length nearly glabrous: lvs. triangular-oblong or -ovate, cordate at base, the blade 2-4 in. long, 2-3-lobed on either side in a pinnate form, the lobes serrate and more or less angled, stipules triangular-acute: fls. few on peduncles usually not overlapping the foliage, the pedicel little if any below the spur; corolla about  $\frac{3}{4}$  in. long, blush to rose or violet with deeper veins and markings, petals narrow and upper 2 larger. S. Afr., and an old garden plant but apparently not now common.

7. *P. vitifolium*, Ait. Erect, becoming shrubby, to 3 ft., grayish-hirsute-pubescent: lvs. numerous, with rather short stout petioles, cordate-ovate to nearly reniform, 2-3 in. across and of equal or less length, with about 3 main shallow very obtuse lobes on the digitate order but which are not again manifestly lobed but variously angled, the margins crenate to somewhat acutely dentate: fls. small, several to many in dense umbels on short peduncles, sessile or nearly so; corolla about  $\frac{1}{2}$  in. or less long, rose or pink with darker veins, 2 upper ones larger. S. Afr.; long in cult. but not now often seen.

8. *P. graveolens*, L'Her. Fragrant-leaved bushy plant, 2-3 ft., becoming woody, grayish-green, hairy-pubescent: lvs. long-petioled, broadly cordate-ovate to nearly circular, with 5-7 lobes close together extending nearly to the base, on a digitate order and the lobes again lobed into flat divisions something like  $\frac{1}{4}$  in. across, the margins variously dentate: fls. small, among the lvs. in dense little umbels on short peduncles, nearly or quite sessile; corolla about  $\frac{1}{2}$  in. long, rose or pink and veined purple, petals entire, the 2 upper ones larger. S. Afr.—The commonest form of Rose Geranium, and much grown in window-gardens for its sweet-scented herbage. Nos. 6-10 are all rose geraniums, but none so popular as this species. Many of the rose geraniums are apparently hybrids of different grades of complexity. *P. roseum* is a garden name applied in this group. *P. terebinthinaceum*, Small (*Geranium terebinthinaceum*, Cav.), is considered by the latest monographer to be *P. quercifolium*  $\times$  *P. graveolens*.

9. *P. Radula*, L'Her. Much like No. 8 except that the lvs. have narrow lobes that stand apart from each other, the lobes mostly about  $\frac{1}{8}$  in. broad with very few and distant teeth: petals entire. S. Afr.—Although long in cult., it is not often seen in the typical narrow-lobed form.

10. *P. denticulatum*, Jacq. A rather weak plant, with still more skeletonized lf.-forms than in No. 9: lobes linear and long, the margins of lobes and rachis cut down nearly to the midrib with many teeth: 2 upper petals lobed. S. Afr.—Somewhat grown for its ornamental foliage as well as its balsamic odor, sometimes as *P. filicifolium* (fern-leaved).

11. *P. crispum*, L'Her. Stocky woody little strict-growing plant, but becoming 2-3 ft. high with age, scabrous-pubescent, grayish, very leafy: lvs. small, usually not exceeding 1 in. long, often more or less 2-ranked, cordate-reniform to round-ovate, entire at base, the limb rounded and somewhat obtusely toothed and incised but not divided, the margin crisped: fls. 1-3 on short stout peduncles, nearly sessile; corolla  $\frac{3}{4}$ -1 in. long, pink or rose with darker markings, the 2 upper ones larger and sometimes emarginate. S. Afr.—An old-time garden plant with lemon-scented foliage, sometimes grown as *P. fragrans* and *P. odoratum*. The usual Lemon Geranium, with larger lvs., is probably a derivative.

## 79. OXALIDACEÆ. OXALIS or WOOD-SORREL FAMILY

Species more than 350, widely spread in temp. and trop. regions, annual and perennial herbs, sometimes shrubs and trees, several of which are grown for ornament and very few for edible parts; probably 10 or more genera are to be recognized; juice usually sour.—Technically the family differs from Geranaceæ in the fact that the carpels do not split apart and the stamens are twice the number of petals: lvs. usually compound, either digitate or pinnate: fls. bisexual and regular, the sepals and petals 5 and sometimes more or less united at base; stamens 10 in at least 2 whorls, hypogynous, the outer set opposite the petals, filaments joined near base and some or all of them with glandular appendages at base; styles separate; ovary superior, 5-celled, 2- to many-ovuled: fr. a dry dehiscent caps. or fleshy and berry-like. *I*, Fig. 10, page 387.

Lvs. digitate: herbs or subshrubs: fr. capsular.....1. *OXALIS*  
Lvs. pinnate: trees: fr. baccate.....2. *AVERRHOA*

1. *OXALIS*, L. WOOD-SORREL. About 300 species of herbs, sometimes woody at base, if the genus as formerly understood is not divided.—Plant acaulescent or caulescent, annual or perennial, often with tuberous or bulbous underground parts: lvs. alternate, digitate; lfts. 3 or 5 to 20 or more, sensitive to light (going to "sleep" at night): fls. 1 to several, terminating axillary peduncles, white, pink, red, yellow; stamens 10, monadelphous at base, 5 long and 5 short; styles 5: fr. a loculicidal caps. (*Ox-alis*: Greek for *sour*.)—Some of the species are grown in window-gardens and as hanging-basket subjects, also in the open border; a few are hothouse subjects; certain kinds are grown elsewhere for the edible bulbous roots; several species are common weeds. The fls. are dimorphic and trimorphic, and some of them produce small fls. fertilized in the bud. *O. Acetosella*, L., the European wood-sorrel, an acaulescent spring-flowering little plant with shamrock-like lvs. and fls. white with purple veins or purple or blue, and entire petals, is probably sometimes cult. in this country; but the stock is more likely to be the American representative, *O. montana*, Raf. (*O. americana*, Bigel.), a summer-blooming plant with notched petals which are white with colored lines (also a rose-purple variation).

Fls. yellow.

Plant fibrous-rooted, producing neither tubers nor bulbs.

St. stout, ascending or erect.

Lfts. large, fish-tailed at end.....1. *O. Origiesi*

Lfts. ordinary, obcordate.....2. *O. valdiviensis*

St. weak and prostrate, often rooting.....3. *O. corniculata*

Plant producing bulbs.....4. *O. cernua*

Fls. pink, rose, or purple.

Fls. 1½-2 in. across.....5. *O. Bowleana*

Fls. much smaller.....6. *O. rubra*

1. *O. Origiesi*, Regel. Perennial; st. strict and straight, purplish, 12-18 in., pubescent: lvs. long-petioled, 3-foliate, purplish beneath; lfts. 1½-2 in. long, tapering to base, the terminal one broadly notched one-third its depth into nearly or quite acute lobes, the lateral ones with 1 lobe smaller than the other: fls. about ½ in. long, yellow with darker veins, few in forking cymes on slender axillary peduncles. (Bears the name of E. Origies.) Andes of Peru; a glasshouse plant.

2. *O. valdiviensis*, Barn. Grown as an annual, probably perennial; sts. ascending, 2-8 in. long and bearing many long-stalked erect lvs. and very long peduncles, glabrous: lvs. 3-foliate; lfts. about ¾ in. long, broadly obcordate: fls. in close umbellate cymes, small, ½-¾ in. long, bright yellow and striped brown inside, profusely produced. Chile.

3. *O. corniculata*, L. (*Xanthoxalis corniculata*, Small). Small loosely pubescent or nearly glabrous plant with creeping sts., the shoots ascending 1-6 in.; perennial but blooming first year: lvs. 3-foliate; lfts. about ½ in. long in large-leaved races, broadly obcordate: fls. few, mostly not exceeding ¼ in. long, light yellow, more or

less reflexed: caps. appressed-pubescent. Old World, and a common weed in this country; frequent on the floor of greenhouses and on pots and tubs in the close-creeping form var. **repens**, Zucc. Var. **atropurpurea**, Planch. (*O. tropæoloides*, Schlecht.), is a purple-leaved race sometimes used in bedding.

4. **O. cernua**, Thunb. (*Bulboxalis cernua*, Small). BERMUDA-BUTTERCUP. Perennial from a deep thickened or tuberous tap-root and scaly bulbs, acaulescent: lvs. 3-foliate, very long-stalked; lfts. about 1 in. broad in well-developed specimens and not so long, deeply obcordate, thinly hairy beneath and ciliate, often spotted: fls. several on very long peduncles, nodding, 1-1½ in. across, bright yellow and showy. S. Afr.; naturalized in Bermuda and Fla.—There is a double-fl. form.

5. **O. Bowiana**, Lodd. (*O. Bowiei*, Herb. *Caudoxalis Bowiana*, Small). Perennial from deep thickened roots and large separated scaly bulbs; parts finely pubescent: lvs. spreading, with rather short stout petioles, much overtopped by the long peduncles, 3-foliate; lfts. 1-1½ in. across, orbicular-obovate and emarginate: fls. 1½-2 in. across, rose-purple, very showy. S. Afr.

6. **O. rubra**, St. Hil. Perennial from a woody crown and root-tubers, essentially acaulescent: lvs. very slender-stalked, upright, 3-foliate; lfts. 1-2 in. across but less in length, very broadly obcordate, papillose or flecked, appressed-hairy both sides: fls. several to many in mostly compound umbellate cymes on peduncles surpassing the foliage, ½-¾ in. long, pink or rose with deeper veins (varying to lilac and whitish). Brazil; a frequent window plant, very floriferous; probably sometimes known as *O. rosea*.

2. **AVERRHOA**, L. Three or 4 evergreen trees of trop. Asia., two of which are introduced into trop. Amer. and S. Fla. for the edible frs.—Lvs. alternate, odd-pinnate, somewhat sensitive; lfts. several to many, alternate or semi-opposite, entire: fls. very small, fragrant, borne in short clusters sometimes on naked branches or beneath the lvs.; sepals 5, the outer ones shorter; petals 5, white, red, or purple; stamens 10, alternate ones longer and shorter; styles 5 and distinct: fr. fleshy and large, drooping, longer than broad, lobed or furrowed lengthwise, with few or numerous seeds. (Averrho-a: bears the name of Averrhoes, 1149-1217, Arabian physician.)

Lfts. 20 or more.....1. *A. Bilimbi*  
Lfts. 10 or less.....2. *A. Carambola*

1. **A. Bilimbi**, L. BILIMBI (from the oriental vernacular name). Tree to 50 ft. or more, rusty-pubescent on young parts and petioles: lfts. numerous, 25-45, mostly oblong-lanceolate, acuminate, 2-3 in. long, pubescent: fls. on short branchlets or spurs below the lvs., on the trunk or branches; petals ½-¾ in. long, red-purple; stamens all antheriferous: fr. 2-4 in. long, cylindrical, obscurely 5-angled, greenish-yellow becoming translucent, juicy, with few flattened seeds; very sour, and used as a relish or for making conserves. India or Malaya, known only as a cult. or naturalized plant in trop. countries.

2. **A. Carambola**, L. CARAMBOLA (from oriental vernacular name). Tree to 30 ft., the young parts finely pubescent or glabrate: lfts. 5-9, ovate to elliptic, short-pointed, mostly 1-2 in. long, pubescent or nearly glabrous beneath: fls. in the lf.-axils; petals about ¼ in. long, white marked purple; 5 stamens without anthers: fr. 3-5 in. long, ovoid or ellipsoid, with 3-5 deep ribs, yellow or yellow-brown; very pulpy, mildly acid or even sweet when ripe, fragrant, used as a vegetable or dessert. Malayan region, and widely spread in tropics.

## 80. TROPÆOLACEÆ. TROPÆOLUM FAMILY

Herbs annual or perennial, often climbing by means of coiling petioles, only 1 genus of 50 species, Mex. to Chile, grown as flower-garden subjects.—Roots sometimes tuberous: sts. soft, more or less succulent: lvs. alternate, digitately angled or peltate, sometimes lobed and dissected: fls. solitary on long axillary peduncles, very irregular, usually showy, yellow, orange, blue, or purple; sepals 5, one produced into a long slender nectar-spur; petals 5 or sometimes fewer by abortion, clawed, often cut or fringed, the 2 upper ones unlike the others and usually smaller and inserted in the opening of the spur;



stamens 8, distinct, unequal; ovary 3-lobed and 3-celled: fr. of 3 1-seeded indehiscent conjoined carpels.

**TROPÆOLUM**, L. **NASTURTIIUM** (of gardeners). Character of the family. (Tropæ-olum: Greek *trophý*, from the peltate or shield-like lvs.)—**T. tuberosum**, Ruiz & Pav., from Peru, is rarely cult. in our territory; it is grown in S. Amer. for the edible ground tubers which are 2-3 in. long; st. climbing; lvs. peltate, 5-lobed; fls. small, yellow-and-red.

Lvs. deeply lobed.....1. *T. peregrinum*  
Lvs. orbicular to reniform, not lobed, more or less angled.....2. *T. majus*

1. **T. peregrinum**, L. (*T. canariense*, Hort.). CANARY-BIRD-FLOWER. Glabrous climbing annual: lvs. long-petioled, peltate, 1-2 in. across, orbicular in outline, deeply 5-lobed, the lobes mostly apiculate: fls. canary-yellow,  $\frac{3}{4}$ -1 in. across, with green curved spur about  $\frac{1}{4}$  in. long, the 2 upper petals large, erect and fimbriate, the 3 lower petals small and ciliate. Probably Peru and Ecuador.

2. **T. majus**, L. GARDEN NASTURTIIUM. Common cult. tender annual, but probably perennial or plur-annual, dwarf or climbing, glabrous or sparsely hairy, more or less succulent: lvs. long-petioled, orbicular or somewhat reniform, 2-7 in. across, peltate and with about 9 main nerves radiating from the petiole, margins variously angled or sinuate but otherwise entire, some of the nerves frequently ending in a mucro, under surface usually more or less close-hairy or papillose: fls. yellow, red, scarlet, maroon, creamy-white, varicolored, 1-2 $\frac{1}{2}$  in. across; spur 1-1 $\frac{1}{2}$  in. long, straight or curved; petals mostly rounded but sometimes short-pointed or even toothed, the lower ones deeply fringed on the claw.—**T. peltophorum**, Benth. (*T. Lobbianum*, Veitch), supposed to be in cult., is marked by pubescence on sts., foliage and fls., lvs. marked with 3-5 or more prominent points at the ends of nerves, the 3 lower or all the petals toothed, fls. uniformly orange-red. **T. minus**, L., is glabrous throughout; lvs. with prominent points terminating the nerves: fls. small (1 $\frac{1}{2}$  in. or less across) with petals terminating in a central point or mucro, the 3 lower petals (and perhaps all of them) marked by dark lines and central blotch. All three are native in S. Amer.; the common garden nasturtium is probably a cultigen, with *T. majus* contributing most of the character. The fl.-buds and young seeds of nasturtium are sometimes used in pickles for their piquancy, often under the name Indian Cress.

## 81. LINACEÆ. FLAX FAMILY

Herbs or shrubs, of about 14 genera and 150 species of wide geographical distribution, yielding a few cult. subjects.—Lvs. alternate or rarely opposite, simple; stipules small or none: fls. bisexual, regular; sepals 5, rarely 4, free or united at base, imbricated, persistent; petals of the same number and alternate with sepals, imbricated, convolute; stamens of same number and alternate with petals, the filaments monadelphous at the often glandular base, often with 5 or more staminodia; ovary of 2-5 carpels, or 4-10-celled by the intrusion of false septa, with 1 or 2 ovules in each cell; styles as many as cells of ovary: fr. usually a caps., sometimes a drupe.

Plant an herb: styles 5.....1. LINUM  
Plant a subshrub: styles 3-4.....2. REINWARDTIA

1. **LINUM**, L. FLAX. Ninety or more species of annual and perennial herbs, in temp. and warm regions of the earth, several of which are grown for ornament and *L. usitatissimum* for its fiber and its seeds which yield linseed oil.—Erect-growing, with tough cortex, glabrous or rarely pubescent: lvs. sessile, narrow, usually entire, with or without stipular glands, alternate in ours: fls. in terminal or axillary racemes or cymes, red, yellow, blue or white, opening in sunshine, the 5 petals fugacious; ovary 5-celled, or 10-celled by false partitions, with 2 ovules in each cell, the 5 styles free or united to the middle: caps. dry, septicidally dehiscent or indehiscent. (Li-num: classical name of the flax.)

|   |                            |
|---|----------------------------|
| Fls. yellow.....                        | 1. <i>L. flavum</i>        |
| Fls. in shades of red.....              | 2. <i>L. grandiflorum</i>  |
| Fls. blue or white.....                 |                            |
| Annual: fls. about ½ in. across.....    | 3. <i>L. usitatissimum</i> |
| Perennial: fls. about 1 in. across..... | 4. <i>L. perenne</i>       |

1. *L. flavum*, L. Erect perennial, from a somewhat woody base, 1-2 ft. high, the branches grooved: lvs. spatulate or lanceolate: fls. in a much-branching cyme, the branches strongly ascending, golden-yellow, about ¾ in. across; sepals glandular-ciliate, acute, much exceeded by petals. Eu.

2. *L. grandiflorum*, Desf. FLOWERING FLAX. Erect branching leafy annual 1-2 ft. high: lvs. oblong to lanceolate, grayish-green: fls. 1-1½ in. across, red in different shades, terminating very slender pedicels which are 1-3 in. long, forming a lax panicle, the petals much exceeding the pointed scarious-margined ciliate sepals: caps. dehiscent at summit. N. Afr.

3. *L. usitatissimum*, L. FLAX. Very slender-branching annual 1-4 ft. high: lvs. small, linear or lanceolate, acute: fls. about ½ in. across, blue or white, in a terminal leafy many-fl. panicle; sepals ovate, acuminate, 3-nerved, the interior ones scarious-margined and ciliate, about half as long as petals: caps. slightly longer than calyx, nearly indehiscent. Widely distributed, probably originally from Asia; escaped in waste places in N. Amer.; a plant of ancient and extensive cult.

4. *L. perenne*, L. Very similar to the common flax but differing in being a perennial seldom more than 2 ft. high: fls. about 1 in. across, blue or white, in few-fl. racemose cymes; sepals obovate, at least the inner ones obtuse and entire, 3-5-nerved: caps. dehiscent, on inclined pedicels. Eu.

2. **REINWARDTIA**, Dumort. Two Indian species of subshrubs, one often grown in greenhouses.—Differing from *Linum* in habit, the larger lvs. with minute subulate caducous stipules, and the 3-4 styles: fls. yellow, in axillary or terminal cymose fascicles or rarely solitary, the 5 petals fugacious and much longer than the 5 entire sepals; ovary 3-4-celled with 2 ovules in each cell: caps. globose, dehiscent into 6-8 parts. (Reinwardtia: after K. G. K. Reinwardt, 1773-1822, scientist of Leyden.)

*R. indica*, Dumort. (*R. trigyna*, Planch. *Linum trigynum*, Roxb.). Subshrub 2-4 ft. high: lvs. elliptic-obovate, entire, mucronate: fls. yellow, 1-2 in. across, solitary or in few-fl. fascicles, the petals united below into tube; styles 3. Mts. of India.

## 82. RUTACEÆ. RUE FAMILY

Upwards of 100 genera and 900-1,000 species comprise the known members of the Rue family, in trop. and subtrop. countries with extensions into temp. regions, in many parts of the world; the family is rich in aromatic qualities, and it yields essential oils, edible frs., and ornamental or odorous subjects.—Mostly woody plants, often good-sized trees: lvs. alternate or opposite, commonly with pellucid dots, simple or pinnate (lft. only 1 in some cases), frequently evergreen: fls. mostly bisexual but in some cases polygamo-dioecious; sepals 3-5, often connate, sometimes wanting; petals also 3-5, imbricated or valvate; stamens same number or more often twice the number of the petals, rarely 15, inserted at the base of a thick annular disk; ovary single and with 2-5 carpels or sometimes the carpels distinct and forming 2-5 pistils; styles usually connate; cells with 1 to many ovules: fr. various, in some genera capsular and dehiscent, in others samara-like, in others fleshy and berry-like and often very large.—In *Citrus* and certain others, the apparently simple lvs. are really 1-foliolate as indicated by the joint at the apex of the rachis (petiole), the 2 lateral lfts. being absent (but sometimes present on young shoots).

Several genera yet little known in this country have economic values and are likely to attract attention, as the following:

**ÆGLE Marmelos**, Corr., the BÆL FRUIT of India: small tree with 3-foliolate lvs. on wingless petioles; lfts. ovate to elliptic, sinuate-serrate: fr. very hard-

shelled, 3-6 in. diam., globular or ovoid, greenish-yellow, 10-15-celled, fragrant, with edible pulp.

**CLAUCENA Lansium**, Skeels (*C. Wampi*, Oliv.), the **WAMPI** of S. China, grown somewhat in Hawaii: small tree with dense evergreen foliage: lvs. odd-pinnate, of 5-9 ovate-elliptic shiny entire lfts: fr. in clusters, ovate-globose, yellowish-brown, about 1 in. long, with balsamic odor, edible.

**MICROCITRUS australasica**, Swingle (*Citrus australasica*, F. Muell), the **FINGER-LIME** of Australia: spiny shrub or tree with simple obovate, cuncate or rhomboidal lvs.  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long: fls. very small, with free stamens: fr. finger-like, 2 $\frac{1}{2}$ -4 in. long and 1 in. or less thick, smooth, very acid: suggested as a hedge plant and as a parent in breeding experiments.

**CHÆTOSPERMUM glutinosum**, Swingle, the **TABOG** of the Philippines, is a small spiny tree suggested as a stock for citrus frs.: lvs. 3-foliolate, persistent, with margined petioles, the lateral lfts. very small: fls. slender-pedicelled in the axils: fr. oblong, 2-3 in. long, with leathery rind, 8-10-celled, with hairy seeds.

**LUVUNGA scandens**, Buch.-Ham., the **LAVANGA** of India and Malaya, is a climbing shrub supporting itself by means of recurved axillary spines, suggested as stock for citrus frs. and for breeding: lvs. 3-foliolate, with wingless petioles: fls. in axillary clusters, white and fragrant: fr. yellowish, resinous, size of gooseberry.

**PARAMIGNYA monophylla**, Wight. Climbing shrub of India, with recurved spines, suggested for experiment as stock for citrus frs.: lvs. simple: fls. large, white: fr. small, globular or elliptic, gummy.

- A. Pistils distinct or the ovary deeply 2-5-lobed; styles ventral or basal or sometimes the stigmas connate: fr. capsular or follicular.
  - B. Ovules 3 or more in each cell.
    - c. Stamens straight and erect..... 1. **RUTA**
    - cc. Stamens declined and usually curved..... 2. **DICTAMNUS**
  - BB. Ovules 1 or 2 in each cell.
    - c. Fls. unisexual..... 3. **EVODIA**
    - cc. Fls. bisexual.
      - d. Petals distinct and more or less spreading.
        - E. Lvs. simple, small and heath-like..... 4. **DIOSMA**
        - EE. Lvs. in ours pinnate, with very narrow divisions..... 5. **BORONIA**
        - EEE. Lvs. ternate..... 6. **CHOISYA**
      - DD. Petals connivent or connate to form a tube, at least till expanded: lvs. simple, stellate-pubescent..... 7. **CORREA**
  - AA. Pistil 1, entire or only slightly lobed; style terminal: fr. baccate or drupaceous, sometimes dry.
    - B. Fr. a dry samara..... 8. **PTELEA**
    - BB. Fr. fleshy and often juicy, berry-like or orange-like.
      - c. Lvs. digitate..... 9. **CASIMIROA**
      - cc. Lvs. several-pinnate, the petiole and rachis not winged.
        - d. Lfts. acute or acuminate, mostly opposite..... 10. **PHELLODENDRON**
        - DD. Lfts. obtuse, mostly alternate..... 11. **MURRÆA**
      - ccc. Lvs. simple, or if compound then mostly ternate (exceptions in No. 17) and the lateral lfts. strictly opposite, petiole and rachis usually more or less winged.
        - d. Mature fr. small and berry-like, fleshy or mucilaginous, but without pulp-vesicles.
          - E. Foliage of simple lvs.
            - F. Plant spiny..... 12. **SEVERINIA**
            - FF. Plant spineless..... 13. **SKIMMIA**
          - EE. Foliage of 3-foliolate lvs..... 14. **TRIPHASIA**
        - DD. Mature fr. of the orange and lemon kind, the compartments filled with pulp-vesicles containing juice.
          - E. Lft. 1 (lvs. apparently simple), persistent.
            - F. Ovary 8-15-celled..... 15. **CITRUS**
            - FF. Ovary 3-5-celled..... 16. **FORTUNELLA**
          - EE. Lfts. 3-7, persistent: ovules 1 in each cell..... 17. **CITROPSIS**
          - EEE. Lfts. 3, deciduous: ovules 2 or more in each cell..... 18. **PONCIRUS**

1. **RUTA**, L. **RUE**. Perennial herbs and subshrubs of some 40 species in the Medit. region and eastward, one or two grown for aromatic and medicinal qualities.—Lvs. alternate, simple, 3-foliolate, pinnate or multifid, glandular-punctate: fls. small and not showy, in terminal erect clusters; calyx small and persistent, with 4 or 5 lobes or sepals; petals 4 or 5, often toothed or fringed; stamens 8 or 10; ovary 4- or 5-celled with central style, the ovules several in each cell: fr. capsular, 4- or 5-lobed, dehiscent or indehiscent. (Ru-ta: the classical name of rue.)

- Lobes of caps. rounded: petals entire or toothed.....1. *R. graveolens*  
 Lobes of caps. acute: petals fringed.....2. *R. chalapensis*

1. **R. graveolens**, L. COMMON RUE. Strong-scented erect glaucous glabrous herb 1-3 ft. high: lvs. 2-3-pinnate or -divided, margins nearly or quite entire, the segms. oblong to spatulate: fls. about  $\frac{1}{2}$  in. across, with involute entire or toothed margins and large obtuse carpels, yellowish. S. Eu.; often escaped, or persistent about old premises.

2. **R. chalapensis**, L. Similar, but lf.-divisions usually narrower; petals fringed; carpels pointed. Medit. region; sparingly introduced and perhaps confused with No. 1.

2. **DICTAMNUS**, L. DITTANY. FRAXINELLA. Several forms but probably representing only 1 variable species, long grown in gardens for ornament.—Strong long-lived perennial, more or less woody at base: lvs. alternate, odd-pinnate, pellucid-punctate: fls. large and showy, in terminal racemes on bracted pedicels, white, pink, or rose-violet; sepals 5, lanceolate and not prominent; petals 5, narrow, acute, the lowest one declined; stamens 10, declined and usually upwardly curved, equaling or exceeding petals; ovary deeply 5-lobed, becoming a hard divided caps. (Dictamnus: old Greek name.)

**D. albus**, L. (*D. fraxinella*, Pers.). Stout strong-smelling plant, 2-3 ft., forming clumps: lfts. 9-11, ovate, serrulate: fls. about 1 in. long. S. Eu. to N. China.—Several color races are cult. and named; also forms passing as *D. caucasicus* and *D. dahuricus*. Sometimes called Gas-Plant and Burning-Bush as it will often give a flash of light when a burning match is held under the fl.-cluster near the main st. on a still sultry evening.

3. **EVODIA**, Forst. About 50 shrubs and trees, evergreen or deciduous, of farther Asia, Australia, and Polynesia, suitable for ornament; foliage aromatic when bruised.—Lvs. simple or pinnate, opposite, punctate: fls. unisexual, in panicles or corymbs, mostly 4-merous sometimes 5-merous, not large, the carpels usually prominent and 2-ovuled: fr. of 4 or 5 nearly or quite distinct 2-valved dehiscent carpels. (Evo-dia: Greek *pleasant odor*.)

**E. Daniellii**, Hemsl. Small deciduous tree hardy in New England, in foliage somewhat resembling an ash: lvs. odd-pinnate; lfts. 7-11, ovate or oblong-ovate, about 2-3 in. long, acuminate, entire, very short-stalked, much paler beneath and hairy along the veins: fls. in Aug., in terminal flattish clusters, white: fr.  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, black, short-beaked. Korea and N. China; early collected by Daniell.

4. **DIOSMA**, L. About a dozen species of small heath-like shrubs in S. Afr., one of them frequently grown under glass for the small but bright bloom and in the open in Calif. and elsewhere.—Lvs. simple, small and numerous, lanceolate-acute or linear, alternate or opposite, glandular-punctate: fls. white or reddish, small but many, either nearly solitary or in axillary clusters, 5-merous; calyx deeply parted; disk sinuate and plaited; ovary prominently lobed: fr. a 5-carpelled caps., the cells 1-seeded. (Dios-ma: Greek *divine odor*, from the fragrance of bruised lvs.)

**D. ericoides**, L. Much branched, 1-2 ft. high, glabrous: lvs. alternate, close together, nearly subulate,  $\frac{1}{2}$  in. or less long, keeled: fls. 2-3 together, short-pedicelled on short side shoots, about  $\frac{1}{2}$  in. across, mostly reddish.

5. **BORONIA**, Sm. About 60 shrubs and subshrubs in Australia, two of them showy and fragrant pot plants under glass and in the open in warm regions.—Lvs. simple, ternate or odd-pinnate (in ours pinnate), small, opposite: fls. 1 or 2 mostly axillary along the st., red, purple, or white, 4-merous; calyx lobed or parted; stamens 8; disk entire; ovary 4-parted, with 4 terminal styles; ovules usually 2 in each cell: fr. of 2-4 carpels. (Boro-nia: named by Sir J. E. Smith to commemorate Francesco Borone who aided him in Greece and who lost his life there in 1794.)



- Lvs. sessile, with 1 or 2 lateral pairs of lfts. .... 1. *B. megastigma*  
 Lvs. petioled, with 2-6 pairs of lfts. .... 2. *B. elatior*

1. *B. megastigma*, Nees. Twiggy, 1-2 ft.: lvs. rather few, sessile, of 3-5 narrow-linear and rather stiff lfts. less than 1 in. long: fls. purple outside and yellow inside, nearly globose,  $\frac{1}{2}$  in. across, mostly scattered or remote, spreading or nodding.

2. *B. elatior*, Bartl. Taller, more leafy: lvs. stalked, with 2-6 pairs of flat linear lfts.: fls. rose-red or purplish, subglobose,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, many, nodding, often variable in color on one plant.

6. *CHOISYA*, HBK. One ornamental shrub from the mts. of Mex., planted in Calif. and Ore., also in Fla. and elsewhere, and sometimes under glass.—Lvs. opposite, ternate, long-petioled, with pellucid dots: fls. rather large, in a large terminal forking cluster, white, 5-merous; stamens 10; disk hairy; ovary 5-lobed, with 5-lobed stigma; ovules 2 in each cell: fr. a 5-valved caps. (Choisy-a: J. D. Choisy, 1799-1859, Swiss botanist and philosopher; wrote on Convolvulaceæ and Hypericaceæ.)—A second species from Tex. to Ariz. and N. Mex., is usually referred to *Astrophyllum*.

*C. ternata*, HBK. MEXICAN-ORANGE, from the fragrance of the orange-like blossoms: 4-8 ft., pubescent on young parts: lfts. thick, narrow-oblong to lance-obovate, 2-3 in. long, obtuse, entire, with gland-dotted revolute margins: fls. about 1 in. across.

7. *CORREA*, Andr. About a half-dozen Australian shrubs or small trees, one sometimes raised under glass and planted in S. Calif. and elsewhere.—Stellate-pubescent: lvs. simple, thick, opposite, punctate: fls. showy and mostly large, more or less nodding, red, white, yellow, or greenish, 4-merous; calyx short and truncate, cup-shaped; corolla long and apparently tubular because of the connivent pubescent petals; stamens 8; disk 8-lobed; ovary 4-parted with single filiform style; ovules 2 in each cell: fr. of 4 nearly distinct carpels. (Corre-a: Jose Francesco Correa de Serra, 1750-1823, Portuguese botanist.)

- Fl. short, the petals spreading on expansion. .... 1. *C. alba*  
 Fl. long, 1 in. or more, petals connivent or connate till fl. falls. .... 2. *C. speciosa*

1. *C. alba*, Andr. Branchy bush 3-4 ft.: lvs. orbicular, oval or broad-obovate,  $\frac{1}{2}$ -1 in. long: fls. white or pink, about  $\frac{1}{2}$  in. long, the petals soon spreading.

2. *C. speciosa*, Ait. Bush 2-3 ft.: lvs. various, orbicular, elliptic to oblong-lanceolate: fls. 1-1 $\frac{1}{2}$  in. long, remaining tubular-campanulate, typically scarlet but varying to white and green; an old garden plant with a surprising range of color and form, as the species is usually defined.

8. *PTELEA*, L. HOP-TREE. N. American spineless shrubs or small trees, in several forms but probably reducible to 3 species; planted for ornament.—Foliage strong-smelling; lvs. mostly alternate and 3-foliolate, pellucid-punctate: fls. prevailing unisexual (or polygamous), small, in short dense clusters that are exceeded by the lvs., usually 4- or 5-merous; petals exceeding the minute sepals; stamens 4 or 5, abortive in the pistillate fls.; ovary commonly 2-celled and compressed, ovules 2 in each cell: fr. dry, flat, circular, 2-celled and 2-seeded, samara winged all around. (Pte-lea: Greek name of another plant.)

*P. trifoliata*, L. Large rather coarse shrub or small tree to 25 ft.: lfts. ovate to elliptic-oblong, 2-5 in. long, nearly or quite sessile, tapering or acuminate, the terminal one narrowed at base, entire or finely crenulate, becoming glabrous: fls.  $\frac{1}{2}$  in. or less across, greenish-white: fr. oblong-orbicular, the thin broad wing very veiny. N. Y. to Fla. and west; a yellow-leaved kind (var. *aurea*) is cult.

9. *CASIMIROA*, Llave & Lex. Evergreen trees and shrubs of trop. Amer., one grown for its edible fr.—Lvs. alternate, digitate (rarely unifoliolate), coriaceous, usually with pellucid dots: fls. bisexual (ovary sometimes abortive),

small, in short terminal or axillary panicles or corymbs, mostly 5-merous; calyx minute, deeply lobed; stamens as many as petals (commonly 5); ovary usually 5-lobed, with 5-lobed or entire stigma; ovule 1 in each cell: fr. a large more or less globose 2-5-seeded drupe. (Casimiro-a: bears the name of Casimiro Gomez de Ortega, Spanish botanist who published from 1763 onward.)

**C. edulis**, Llave & Lex. WHITE SAPOTE. Large tree with ash-gray warty bark: lfts. 3-7, ovate to obovate or lanceolate, 3-5 in. long, obtuse or retuse, entire or obscurely crenulate, stalked, shining above, lightly pubescent beneath: fls. greenish,  $\frac{1}{2}$  in. or less across: fr. subglobose, 3-4 in. diam., greenish-yellow, with yellow soft edible flesh with somewhat bitter flavor. Highlands of Mex. and Cent. Amer.; introduced somewhat in southern parts of U. S.

**10. PHELLODENDRON**, Rupr. About a half-dozen ornamental deciduous trees in E. Asia, closely related.—Lvs. opposite, odd-pinnate, aromatic when bruised: fls. dioecious, in terminal panicles or corymbs, small, greenish and not conspicuous; sepals and petals 5-8; stamens 5-6, exceeding the petals; ovary 5-celled, with single short stout style: fr. a small black berry-like drupe with 5 seeds. (Phelloden-dron: Greek *cork tree*, from the bark of the original species.)

Lvs. green or grayish-green, and pubescent beneath.....1. *P. japonicum*

Lvs. more or less glaucous beneath, and glabrous or with only a few hairs on midrib.

Lfts. ciliate on margins: infl. puberulous.....2. *P. amurense*

Lfts. not ciliate or only slightly so: infl. nearly or quite glabrous...3. *P. sachalinense*

1. ***P. japonicum***, Maxim. Small or medium-sized tree to 30 ft., the bark not corky; young branchlets reddish-brown: lfts. 9-13, ovate to ovate-oblong and acuminate, 3-4 in. long, very unequal at base, margins crenulate and ciliate, villous-pubescent beneath as well as the rachis: infl. tomentose: fr. nearly  $\frac{1}{2}$  in. diam. Cent. Japan.

2. ***P. amurense***, Rupr. CORK-TREE. Strong tree to 50 ft., with deeply fissured corky bark; young branchlets yellowish: lfts. 5-13, ovate to ovate-lanceolate, long-acuminate, 2-4 in. long, narrowed or rounded at base, crenulate and ciliate on margins, somewhat glaucous beneath and glabrous except perhaps for few hairs near base of midrib: fr.  $\frac{1}{2}$  in. or less diam., with turpentine odor when bruised. N. China, Amur, Japan.

3. ***P. sachalinense***, Sarg. Differs from No. 2 in bark not being corky, young branchlets reddish-brown: lfts. 7-11, ovate to ovate-oblong, acuminate, 3-5 in. long, sparingly or not at all ciliate: fl.-clusters nearly or quite glabrous: fr. about  $\frac{1}{2}$  in. diam. Saghalin, N. Japan, Korea, China; very hardy.

**11. MURRÆA**, Kœnig (*Murraia*, Auth. *Chalcas*, L.). About 4 unarmed small trees or shrubs of the Indo-Malayan region, one planted for ornament and its fragrant fls. and as suggested stock for citrus frs.—Lvs. alternate, odd-pinnate: fls. solitary or cymose, 4- or 5-merous, rather large; calyx very small, deeply toothed; stamens 8-10; ovary 2-5-celled, ovules 1 or 2 in each cell: fr. a small few- or several-seeded berry. (Murræ-a: J. A. Murray, 1740-1791, editor of editions of Linnæus' "Systema Vegetabilium.")

**M. exotica**, L. ORANGE-JESSAMINE. Small attractive tree or large bush with abundant shining foliage, glabrous or the young parts puberulent: lfts. 3-9, ovate or somewhat rhombic, 1-2 in. long, obtuse or nearly so, sometimes emarginate, entire or crenulate: fls. white, campanulate,  $\frac{3}{4}$  in. or less long, the petals pointed: fr. ovoid, about  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, pointed, red. India; frequently planted in trop. Amer. and also naturalized.

**12. SEVERINIA**, Tenore. One spiny plant somewhat used for hedges far S.—Shrub or small tree with short stiff branches and a spine on either side the buds: lvs. simple, on short wingless petioles: fls. 2 or 3 together in the axils, bisexual, white, 5-merous; stamens 10, distinct; ovary 2-3-celled, with 1

ovule in each: fr. a small black nearly globular berry. (Severinia: M. A. Severino, 1580-1656, teacher of anatomy and medicine at Naples.)

**S. buxifolia**, Tenore (*Atalantia buxifolia*, Oliv.). Lvs. somewhat resembling those of *Buxus*, obovate-oblong and very obtuse or even emarginate, about  $1\frac{1}{2}$  in. long. S. China, Formosa.

13. **SKIMMIA**, Thunb. Four evergreen unarmed shrubs in Japan and China, sometimes reduced to 1 or 2 species, long grown for the handsome foliage and red berries.—Lvs. alternate, simple and entire, short-petioled, punctate: fls. bisexual or unisexual (diœcious), in panicles, small, the staminate fragrant, white or whitish, 4-5-merous; stamens 4 or 5; stigma 2-5-lobed; ovary 2-5-celled, each cell 1-ovuled: fr. a small drupe with 2-5 stones. (*Skimmia*: *Skimmi* is a Japanese name.)

Plant polygamous or diœcious: fr. globose or compressed at ends.....1. *S. japonica*  
Plant with bisexual fls.: fr. obovoid.....2. *S. Fortunei*

1. **S. japonica**, Thunb. Glabrous throughout except perhaps the infl., to 5 ft., well adapted to pot culture: lvs. contiguous at ends of branches, elliptic to oblong-obovate, 3-5 in. long, narrowed both ways, bright light green above and yellowish-green beneath: panicles 2-3 in. or more long; fls. mostly unisexual, 4-merous, yellowish-white: fr. globose or depressed-globose,  $\frac{1}{2}$  in. diam., bright red. Japan.—There are lf. variables.

2. **S. Fortunei**, Mast. Differs from the above in dwarfer habit, bisexual fls., longer and more acuminate-pointed lvs. (which are 3-10 in. long), dark green above and light green beneath: fr. obovoid, dull red. (Robt. Fortune, page 447.) China.—There is a race (var. *argentea*, Mast.) with white-bordered lvs.

14. **TRIPHASIA**, Lour. One spiny evergreen shrub grown in warm countries, and sometimes under glass, for ornament.—Lvs. alternate, prevailingly 3-foliolate, strongly punctate: fls. solitary or several in axils, bisexual, white, 3- or 4-merous; calyx cup-like, 3- or 4-lobed; stamens 6, with flattened distinct filaments; ovary obovate, with a lobed stigma, ovules solitary: fr. an ovate 1-3-seeded (usually 1-seeded) berry with sweet sticky pulp. (*Triphasia*: Greek *triplex*, probably from the lvs.)

**T. trifolia**, P. Wils. (*T. aurantiola*, Lour.). Shrub or sometimes tree-like, to 15 ft.: spines in pairs at the axils, small but sharp: lvs. dark green, on very short puberulent petioles; terminal lft. large, ovate and retuse, 1-2 in. long, crenate; lateral lfts. 2, much smaller: fls. very fragrant,  $\frac{1}{2}$  -  $\frac{3}{4}$  in. across: fr. dull red,  $\frac{1}{2}$  in. diam. Probably Malayan; widely naturalized in trop. countries.

15. **CITRUS**, L. About a dozen small glossy-leaved evergreen often spiny trees and shrubs of trop. and subtrop. Asia and Malasia, some of them extensively grown for the edible frs. and also for ornament.—Lvs. unifoliolate (apparently simple), alternate, mostly with winged or margined petiole, glandular-dotted: spines, when present, single by the side of the buds: fls. solitary or mostly clustered in the axils or sometimes in lateral cymes or panicles, usually bisexual, white after expansion, commonly 5-merous; stamens 15 or more, arranged in a few bundles; ovary 8-15-celled, with large deciduous style, ovules usually several in each cell: fr. large (as hesperidium), globose or ovoid or oblate, the compartments containing pulp-vesicles and 1-8 large seeds. (Citrus: classical name, first applied to another tree.)—The Bergamot, **C. Bergamia**, Risso, cult. in S. Eu. for the essential oil made from the peel, is a small tree with oblong-oval lvs. and long winged petioles, fls. small, white, and very fragrant, fr. pear-shaped, pale yellow and thin-skinned, 3-4 in. diam.

Lf. without apparent articulation at top of the petiole, the latter wingless.....1. *C. medica*

Lf. manifestly articulated at top of petiole, the latter usually winged or margined.

Petioles margined (not winged): fl.-buds tinted outside.

Fr. without acid juice: dwarf.....2. *C. tailensis*

- Fr. with very acid juice: tree.....3. *C. Limonia*  
 Petioles more or less prominently winged: fl.-buds white.  
 Fls. small, usually 1 in. or less across: fr. 2½ in. or less diam., oval,  
 exceedingly sour.....4. *C. aurantifolia*  
 Fls. larger: fr. usually much larger, mostly globose or oblate, mild,  
 sweet or sour.  
 Fr. very large, 4 in. and more diam., smooth and pale yellow,  
 sour: twigs pubescent.....5. *C. maxima*  
 Fr. medium in size, orange when ripe, the skin more or less rough:  
 twigs glabrous.  
 Wing of petiole very broad: fr. sour.....6. *C. Aurantium*  
 Wing of petiole narrow.  
 Rind of fr. tight; pulp sweet.....7. *C. sinensis*  
 Rind loose.  
 Pulp sweet; segms. usually more than 10.....8. *C. nobilis*  
 Pulp acid; segms. 10 or less.....9. *C. mitis*

1. *C. medica*, L. CITRON. Small tree or large shrub with short stiff spines: lvs. large, 4-7 in. long, oblong, blunt or obtusely short-pointed, serrate, with a wingless petiole that is apparently not jointed at apex to the blade: fls. in panicles or axillary clusters, large, 1½ in. or more across, the petals blunt, white inside and purplish outside; stamens 30 or more; ovary tapering upward: fr. oval or oblong, 6-10 in. long, lemon-yellow at maturity, rough, thick skin very fragrant, the scant pulp acid. Asia (named for the ancient country Media.)—Much grown in Medit. countries and somewhat in U. S., mostly for the rind which is candied. Var. *sarcodactylus*, Swingle, has a fr. with finger-like parts (whence the name *sarcodactylus*, "fleshy-fingered"), each projection representing a carpel or segm.

2. *C. taitensis*, Risso. OTAHEITE ORANGE. A little plant often grown by florists and seen in window-gardens: lvs. oblong to elliptic-oblong, 2-3½ in. long, short-pointed or obtuse, finely crenulate, the petiole narrowly winged or margined: fls. like those of the lemon: fr. orange, lemon-shaped, about 2 in. long, the pulp insipid. Rind of Tahiti (or Otaheite) as the name suggests; probably a cultigen.

3. *C. Limonia*, Osbeck (*C. Limonium*, Risso). LEMON. Small glabrous tree with stout stiff thorns: lvs. little shining, oblong to elliptic-ovate, 2½-4 in. long, short-pointed or obtuse, crenate, the short petioles mostly with very narrow margins, the articulation with the blade prominent: fls. solitary or clustered in the axils, ½-¾ in. long, pinkish outside but white inside; stamens 20 or more; ovary tapering above: fr. oblong to ovoid, with a terminal nipple, 3-5 in. long, light yellow, shallowly roughened, segms. 8-10, very sour. Asia.

4. *C. aurantifolia*, Swingle (*Limonia aurantifolia*, Christm. *Citrus lima*, Lunan, not Aitch. *C. imetta*, Auth., not Risso). LIME. Small glabrous tree with stiff sharp spines: lvs. elliptic-oblong, 2-3 in. long, blunt or sometimes rounded at apex, the short petiole manifestly but narrowly winged, articulation marked: fls. few in the axils, mostly not exceeding ½ in. long, white throughout; stamens 20-25; ovary abrupt at apex: fr. round-oval to oval and small, 1½-2½ in. diam., sometimes with a small nipple, segms. 10, shallowly roughish, exceedingly acid. Asia; much planted in W. Indies and somewhat in S. Fla.

5. *C. maxima*, Merr. (*C. grandis*, Osbeck. *C. decumana*, L.). GRAPEFRUIT. SHADDOCK. PUMMELO. Strong rather glossy-leaved tree, the twigs pubescent: spines slender and not very sharp, or lacking: lvs. large, oval to broad-ovate, 3-6 in. long, rounded or even retuse, on young shoots tapering to blunt point, more or less sinuate-crenate, the petiole broadly winged and obovate: fls. solitary or usually in axillary clusters, large, ¾-1 in. long, the broad petals white; stamens 20-25; ovary rounded, bearing a columnar style and very large capitate stigma: fr. globular or oblate, 4-6 in. diam., often several maturing in a cluster, segms. about a dozen, rind mostly smooth and pale yellow, sour. Asia; much planted in S. Fla. and somewhat elsewhere in the race known as grapefruit.

6. *C. Aurantium*, L. (*C. Bigaradia*, Risso). SOUR or SEVILLE ORANGE. Glabrous tree of medium size, with long but not very sharp spines: lvs. of medium size, ovate-oblong, 3-4 in. long, shortly or bluntly acuminate, sinuate or crenate, the petiole broadly winged: fls. of medium size, single or several in the axils, white and very fragrant; stamens 20 or more; ovary globular: fr. globose and slightly flattened endwise, about 3 in. diam., roughish, pulp acid and membranes bitter, core hollow at maturity, segms. 10-12. (*Aurantia* is a pre-Linnæan name for the orange.) Asia, but naturalized in Fla. and elsewhere.—Grown in S. Eu. for the making of marmalade, and for perfumery from the fls.; used also as stock for the sweet orange.

7. *C. sinensis*, Osbeck (*C. Aurantium* var. *sinensis*, L.). ORANGE. The common orange, extensively grown, not so hardy as No. 6 and also distinguished by spines



few or wanting, petiole narrowly winged or only margined, frs. mostly smaller with pulp sweet and membranes not bitter and the core solid at maturity. Probably China.—The navel oranges also belong here, being known by the supernumerary carpels (or second fr.) interposed in the top of the fr.

8. *C. nobilis*, Lour. Small spineless glabrous tree, with elliptic-oblong crenate lvs. with petioles narrow-winged or only margined: fls. small, white; stamens 18-24: fr. large, depressed-globose, with rough skin that is somewhat loose, the segms. about a dozen, and the rather numerous seeds large like those of *C. sinensis*, pulp very juicy and sweet. S. E. Asia.—The species is known in this country mostly in two vars.

Var. *deliciosa*, Swingle (*C. deliciosa*, Tenore). MANDARIN and TANGERINE ORANGES. Branches slender: lvs. small and narrow, lanceolate to ovate-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, entire or finely crenate-serrulate, the short thin petioles barely margined: fr. depressed or oblate, 2-3 in. diam., smooth and shining, orange or reddish-orange, with very loose skin, segms. easily separating, and small pointed seeds; sometimes known as "kid-glove orange" because the skin may be removed and the carpels separated without soiling the hands.

Var. *Unshiu*, Swingle. UNSHIU or SATSUMA ORANGE. Very hardy: lvs. broader and larger, 3-4 in. long, shortly-acuminate, veins strongly marked on both sides: fls. numerous and small: fr. depressed-globose, 2-3 in. diam., skin loose, deep orange outside and inside, very juicy, segms. 9-13, core hollow, seeds few or none and not beaked.

9. *C. mitis*, Blanco. CALAMONDIN ORANGE. Small glabrous somewhat spiny tree: lvs. elliptic to oblong-elliptic,  $1\frac{1}{2}$ -3 in. long, apex commonly retuse, slightly crenulate, petioles narrowly winged or only margined: fls. solitary or in pairs in the axils, white, small, angled in the bud; stamens about 20: fr. depressed-globose,  $\frac{3}{4}$  1 in. diam., deep orange-yellow, skin loose and thin, segms. 6 or 7 or somewhat more, very acid. Philippines; planted in Hawaii and somewhat in continental U. S.

16. **FORTUNELLA**, Swingle. KUMQUAT. Differs from *Citrus* in the few cells (3-5 or 6) of the ovary, and the 2 ovules in each cell, hollowed stigma: lvs. of 1 lft., densely gland-dotted beneath, persistent: stamens four times as many as petals: fr. small,  $1\frac{1}{2}$  in. or less diam.; 4 or 5 species of E. Asia. (Fortunel-la: Robert Fortune, 1813-1880, English traveler, who introduced the first kumquat into Eu. in 1846.)

Fr. oval, retaining persistent base of style.....1. *F. margarita*  
Fr. globular, without persisting style.....2. *F. japonica*

1. *F. margarita*, Swingle (*Citrus margarita*, Lour.). OVAL KUMQUAT. Shrub or small tree, 10-12 ft., nearly or quite thornless: lvs. lanceolate, tapering both ways,  $1\frac{1}{2}$ -3 in. long, but sometimes to 6 in. long and 2 in. broad, blunt, usually obscurely crenate toward apex, pale green beneath, petiole slightly margined: fls. solitary or few in axils,  $\frac{3}{8}$  in. or less across on very short pedicels; style persistent, scarcely longer than ovary which is 4- or 5-celled: fr. oval or oblong, 1- $1\frac{1}{2}$  in. long, yellow-orange, with imbedded oil-glands, the pulp acid, the skin biting.

2. *F. japonica*, Swingle (*Citrus japonica*, Thunb.). ROUND KUMQUAT. Dwarf: lvs. relatively broader, to 4 in. long, paler beneath: fr. globular, about 1 in. diam., without rudiment of style and segms. usually 5 or 6, bright orange, the skin less harsh.

17. **CITROPSIS**, Swingle & Kellerm. CHERRY ORANGE. A few small spiny African evergreen trees and shrubs differing from *Citrus* in having spines usually in pairs, large 3-7-foliolate lvs., 4- or 5-celled ovary with a single ovule in each cell, stamens only twice as many as petals, and somewhat different pulp vessels being sessile rather than stalked; possibly of use as stocks and as parents for hybridizing in citriculture, one of them at least a promising doorway ornamental in Fla. and Calif. (Citrop-sis: *Citrus*-like.)

*C. Schweinfurthii*, Swingle & Kellerm. (*Limonia Schweinfurthii*, Engler). Shrub or small tree: lvs. 3- or 5-foliolate; lfts. broad-lanceolate, 2-5 in. long, acute or subacute at tip, cuneate at base, prominently serrate; petiole broadly winged, with usually rounded top: fls. axillary in clusters of 4-10, white, about 1 in. across, mostly 4-parted; petals strap-shaped; stamens connate into a tube; ovary rounded, bearing a very short style: fr. lime-like,  $1\frac{1}{2}$  in. diam., sweet. Sudan, where it was early collected by G. A. Schweinfurth, the African explorer, also Uganda and Congo.

18. **PONCIRUS**, Raf. One very thorny small tree or large shrub from Cent. China, used as stock for citrus frs., for hedges, and entering into hybrids, as in the Citrange which is a cross with *Citrus sinensis* extending the range of citriculture much to the northward: differs from Citrus in ability to withstand cold; the 3-foliolate deciduous lvs.; fls. borne on old wood in early spring rather than on shoots of the season, stamens wholly distinct, ovary usually 7-celled (6-8), fr. densely pubescent with a different structure, the pulp vesicles containing oily drops and having hair-like appendages, and other minuter characters. (Ponci-rus: from *poncire*, French name for a kind of citron.)

**P. trifoliata**, Raf. (*Citrus trifoliata*, L.). TRIFOLIATE ORANGE. Branchlets stiff, angled and more or less flattened, with alternate very strong sharp flattened thorns: lvs. often borne on old wood; lfts. elliptic to obovate,  $\frac{3}{4}$ -1½ in. long, obtuse and perhaps emarginate but sometimes acutish, crenulate, the petiole slightly winged: fls. 1 or 2, usually in the axils of thorns in advance of the lvs., white, expanding wide, 1 in. and more across: fr. orange-like but small, 1½-2 in. diam., lemon-colored, very fragrant, downy, the pulp scant.

### 83. SIMARUBACEÆ. QUASSIA FAMILY

About 30 genera and 150 species of trees and shrubs, of wide distribution in trop. and warm regions.—Bark bitter: lvs. alternate or rarely opposite, usually pinnate, not punctate, stipules minute or 0: fls. unisexual, regular, in panicles or racemes; calyx 3-5-lobed or -parted; petals 3-5, rarely 0; disk annular or elongated, entire or lobed, rarely 0; stamens as many or twice as many as petals, often with a scale at base of filament; ovary 2-5-lobed and 1-5-celled or of 2-5 distinct carpels, the ovules usually solitary in the cells; styles 2-5, free or partially united: fr. a drupe, caps. or samara.

**AILANTHUS**, Desf. Deciduous trees of nearly 10 species in Asia and N. Australia, one of which is commonly planted as a shade and street tree.—Lvs. odd-pinnate, the lfts. lanceolate and entire or toothed, of disagreeable odor when bruised: fls. small, greenish, in large terminal panicles, polygamodioecious; calyx short, 5-parted; petals 5, spreading; disk small, 10-lobed; staminate fls. with 10 stamens inserted at base of disk; pistillate fls. with deeply 2-5-parted ovary, the compressed lobes 1-celled with 1 ovule in each cell, the styles connate with divergent plumose stigmas: fr. of 1-5 distinct oblong samaras with the compressed seed in the middle. (Ailanthus: from a vernacular name.)

**A. altissima**, Swingle (*A. glandulosa*, Desf. *A. japonica*, Hort.). TREE-OF-HEAVEN. Rapid-growing tree to 60 ft. or more: lvs. 1-3 ft. long, the 13-25 ovate-lanceolate lfts. stalked, usually truncate at base, acute or acuminate, 3-5 in. long, with 2-4 coarse teeth near base each with a large gland beneath: staminate fls. ill-scented: samaras nearly 2 in. long, twisted. China; naturalized in E. N. Amer.—There is a var. with large drooping lvs. and also one with bright red frs.

### 84. MELIACEÆ. MAHOGANY FAMILY

Trees and shrubs with hard wood, of over 40 genera and 600 species confined to trop. regions, one furnishing the mahogany of commerce and a few other genera planted for ornament.—Lvs. usually alternate, pinnate or rarely simple, exstipulate, not punctate: fls. commonly bisexual, regular, borne in panicles; calyx 4-5-cleft or -parted, imbricated; petals 4-5, rarely 3 or 10, free or united or adnate to stamens; stamens usually 8-10, the filaments commonly united into a tube which is entire or lacerate at top, rarely free; disk various; ovary free or more or less united with the disk, 2-5-celled, rarely 1- or many-celled, with 1-2 or many ovules in each cell, styles and stigma 1: fr. a caps.,

berry or drupe.—The Langsat, *Lansium domesticum*, Correa, native in Malaya, is grown for its edible frs., but does not thrive outside the tropics.

|  |              |
|--|--------------|
| Fr. a small indehiscent drupe.....     | 1. MELIA     |
| Fr. a septicidally dehiscent caps..... | 2. CEDRELA   |
| Stamens free.....                      | 3. SWIETENIA |
| Stamens united into tube.....          |              |

1. **MELIA**, L. BEAD-TREE. About a score of species from trop. Asia and Australia have been described, one of which is widely grown as a shade and ornamental tree.—Deciduous trees or shrubs: lvs. large, 1-3-pinnate, the lfts. entire or serrate: fls. in axillary branching many-fl. panicles, white or purple; sepals 5-6; petals 5-6, free, much exceeding the sepals; stamens united into tube which is divided at top into 10-12 entire or cleft lobes, the 10-12 anthers on the inside of the tube between the lobes; disk annular; ovary 3-6-celled with 2 ovules in each cell, the long style with 3-6-lobed capitate stigma: fr. a small indehiscent drupe; seeds wingless. (Me-lia: ancient Greek name.)

**M. Azedarach**, L. (*M. sempervirens*, Sw.). PRIDE-OF-INDIA. CHINA-TREE. CHINA-BERRY. Tree to 40 ft. and more, with thick trunk, spreading branches and furrowed bark: lvs. bipinnate, petioled, 1-3 ft. long, the numerous lfts. from ovate and elliptic to lanceolate, acute, sharply serrate or lobed: fls. fragrant, purplish, in open long-peduncled panicles: drupe nearly globular,  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam., yellow, smooth. (Azedarach: pre-Linnæan name of Arabic origin.) S. W. Asia; widely naturalized in W. Indies and S. U. S.—Var. **umbraculiformis**, Berckmans, the TEXAS UMBRELLA-TREE, has erect branches which radiate from the trunk, the drooping foliage giving the tree the appearance of a gigantic umbrella. Var. **floribunda**, Morr., is a precocious and very floriferous form, of bushy stature. There are forms with variegated lvs., with the segms. of the lfts. cut into narrow divisions, and with white fls.

2. **CEDRELA**, L. Tall trees with attractive colored wood, of 9 species in trop. Amer. and 8 in E. India and Australia, a few grown as avenue trees and the wood of *C. odorata* much valued for making furniture and boxes.—Lvs. pinnate, the lfts. petioled, entire or slightly serrate: fls. small, whitish, in large pendulous terminal or axillary panicles; calyx short, 4-5-parted; petals 4-5, longer than calyx, keeled below and the keel adnate to the disk; stamens 4-6, inserted on disk, not united, sometimes alternating with as many staminodia; ovary sessile on top of disk, 5-celled with 8-12 ovules in each cell, narrowed into style with disk-shaped stigma: fr. a leathery or woody caps. dehiscent at top by 5 valves, the seeds winged. (Cedre-la: from *Cedrus*, the wood resembling that of *Cedrus*.)

|   |                       |
|---|-----------------------|
| Panicles much longer than lvs.: margins of lfts. more or less serrated..... | 1. <i>C. sinensis</i> |
| Panicles shorter than lvs.: margins of lfts. entire.....                    | 2. <i>C. Toona</i>    |
| Seeds winged at both ends: disk much shorter than the ovary.....            | 3. <i>C. odorata</i>  |
| Seeds winged only below: disk much longer than ovary.....                   |                       |

1. **C. sinensis**, Juss. (*Toona sinensis*, Roem.). Shaggy-barked tree to 50 ft.: lvs. long-petioled, 10-20 in. long, the 10-20 lfts. oblong or oblong-lanceolate, acuminate, slightly and remotely serrate, light green beneath, 4-8 in. long: fls. white, in pendulous panicles much longer than the lvs.; disk much shorter than ovary; staminodia 5, subulate, alternating with stamens: fr. oblong or obovate, about 1 in. long, the seeds winged above. China.

2. **C. Toona**, Roxb. (*Toona ciliata*, Roem.). Nearly evergreen tree to 70 ft.: lfts. 10-20, lanceolate or ovate-lanceolate, acuminate, the margins entire or sometimes undulate, 3-6 in. long: fls. white, fragrant, in panicles shorter than the lvs.; disk much shorter than the hairy ovary: caps.  $\frac{3}{4}$ -1 in. long, the seeds winged at both ends. (Toona: E. Indian name.) Himalayas.

3. **C. odorata**, L. WEST INDIAN or SPANISH CEDAR. Tree to 100 ft., with nearly smooth bark: lfts. 10-20, ovate-lanceolate, acuminate, entire, 4-6 in. long: fls. yellowish, in panicles shorter than the lvs.; disk much longer than ovary: caps. oblong,  $1\frac{1}{2}$  in. long, the seeds winged below. W. Indies.

3. **SWIETENIA**, Jacq. Large trees with hard red-brown wood, of 3 species in trop. Amer.—Lvs. pinnate, glabrous and shining, the petioled lfts. obliquely ovate or lanceolate, long-acuminate: fls. small, in axillary and terminal panicles; calyx small, 5-cleft; petals 5, spreading; stamens united into an urn-shaped tube which is 10-toothed at top, the 10 anthers affixed on the inside of the tube between the lobes; ovary sessile on top of annular disk, 5-celled with many ovules in each cell, the stigma discoid and 5-rayed: fr. a large woody caps., dehiscent from base to tip by 5 thick valves, the 5-winged axis persistent, the seeds winged above. (Swietenia: after Gerard van Swieten, 1700–1772.)

**S. Mahogani**, Jacq. MAHOGANY (an aboriginal American name). Evergreen tree to 75 ft., with large trunk and reddish scaly bark: lvs. even-pinnate, 4–8 in. long, with 4–8 entire leathery lfts.: fls. whitish: caps. ovoid, to 5 in. long; seeds, including wings, 2 in. and more long. Trop. Amer., W. Indies, S. Fla.

## 85. MALPIGHIACEÆ. MALPIGHIA FAMILY

About 55 genera and 650 species of woody plants, of wide distribution in the tropics, particularly in trop. forests of S. Amer., but extending north to S. U. S. and south to S. Afr.—Trees, shrubs or woody vines: lvs. simple, usually opposite, with stipules at base of petiole or on it, often with glands on the blades or petioles: infl. various; fls. commonly bisexual, regular; sepals 5, free or united at base, persistent, some or all bearing glands; petals 5, usually unequal, fringed or toothed, slender-clawed; stamens mostly 10, often part of them staminodia, the filaments united at base or higher up, rarely free, the connectives of the anthers often large; ovary superior, of 3 united or distinct carpels, rarely 2, 4, or 5, each cell with 1 ovule; styles usually 3, free or rarely united: fr. commonly separating into 3 nut-like parts which are often winged, rarely a drupe or nut.

Plant an erect shrub.

Fr. a drupe: calyx glandular.....1. MALPIGHIA

Fr. a caps. dehiscent into 3 parts: calyx usually glandless.....2. THRYALLIS

Plant a woody vine.....3. STIGMAPHYLLON

1. **MALPIGHIA**, L. Trees and shrubs of perhaps 40 species in trop. Amer., one cult. in the tropics.—Lvs. opposite, short-petioled, entire or spiny-toothed, glabrous or pubescent: fls. in axillary contracted cymes or rarely solitary; calyx with 6–10 large sessile glands; stamens 10, all anther-bearing, the filaments united below, glabrous: fr. a drupe, the 3 stones with 3–5 crests or wings on back. (Malpighia: for Marcello Malpighi, 1628–1693, Italian naturalist.)

**M. glabra**, L. BARBADOS-CHERRY. Glabrous shrub to 8 ft. high: lvs. ovate to elliptic-lanceolate, 1–3 in. long, mostly acute, entire, almost sessile, dark green above and paler beneath: fls. rose, about  $\frac{1}{2}$  in. across, in 3–5-fld. cymes; petals erose or fringed: drupes red or scarlet, depressed-ovoid, about  $\frac{1}{4}$  in. long, acid, the skin thin. N. S. Amer. to S. Tex.

2. **THRYALLIS**, L. More than 15 species of shrubs, sometimes climbing, native from Tex. and Calif. south to Brazil.—Lvs. entire, sessile or petioled, bearing 2 glands at base or margin of blade or on tip of the petiole: fls. yellow or reddish, borne in simple or branched panicles, the bracts and bractlets mostly deciduous; calyx usually glandless; petals entire or toothed; stamens 10, all anther-bearing, the filaments united at base; ovary 3-lobed, the styles distinct: caps. 3-lobed, dehiscent into 3 parts. (Thryallis: old Greek name, transferred to this genus.)

**T. glauca**, Kuntze (*Galphimia glauca*, Cav. *G. gracilis*, Bartl.). Slender shrub 4–5 ft. high: lvs. thin, oblong, slender-petioled, about 2 in. or less long, obtuse or abruptly pointed, glabrous and more or less glaucous: panicles many-fld., the rachis usually covered with dark red pubescence when young; fls. yellow, about  $\frac{3}{4}$  in. across, slender-pedicelled. Mex. to Panama, naturalized in W. Indies.—



Sometimes grown as *T. brasiliensis*, but the latter is a very different looking plant with small fls.

3. **STIGMAPHYLLON**, Juss. More than 50 species of trop. American woody vines, a few grown in greenhouses and over trellises.—Lvs. entire or toothed, rarely lobed, often glandular-ciliate, with 2 glands on upper part of petiole: fls. yellow, in axillary peduncled umbel-like corymbs; calyx with 8 glands; petals glabrous, unequal; stamens unequal, 6 anther-bearing, 4 opposite the gland-bearing sepals imperfect; ovary 3-lobed with 3 distinct unequal styles which are leafy or hook-like at apex: samaras 1-3 together, with a flat wing thickened along the ventral side. (*Stigmaphyllon*: from Greek for *stigma* and *leaf*, referring to the lf.-like appendages of the stigma.)—Sometimes written *Stigmatophyllon*.

Lvs. glabrous beneath, margins glandular-ciliate.....1. *S. ciliatum*  
Lvs. pubescent beneath, margins not ciliate.....2. *S. littorale*

1. *S. ciliatum*, Juss. A slender twiner: lvs. long-petioled, ovate to orbicular-ovate,  $1\frac{1}{2}$ –3 in. long, deeply cordate at base, acuminate, the margins glandular-ciliate, bright green above, pale and glabrous beneath: fls. in clusters of 3–6, the petals to  $\frac{3}{4}$  in. long: samaras very broad, about 1 in. long. Brazil, N. S. Amer.

2. *S. littorale*, Juss. A tall leafy climber with large tuberous roots: lvs. long-petioled, orbicular-ovate or oblong, 2–5 in. long, rounded or cordate at base, acute, obtuse or apiculate, dark green and glabrous above, pubescent beneath: fls. many together, 1 in. across. Brazil.

## 86. POLYGALACEÆ. MILKWORT FAMILY

Herbs, shrubs, or small trees, sometimes climbing, of about 10 genera and nearly 1,000 species widely distributed in trop. and temp. regions, a few cult. for ornament.—Lvs. alternate, opposite or verticillate, simple and entire, usually exstipulate: fls. bisexual, irregular, solitary or in racemes, spikes or panicles, the pedicels subtended by bracts; calyx of 5 imbricated free or more or less united sepals, the 2 inner large and often winged or petaloid; petals 3 or 5, at least the 2 upper ones united with each other or with the stamens, the lower petal concave and often with a fringed crest or keel; stamens 10 in 2 series, but mostly reduced to 8 or less, hypogynous, frequently united into a tube which is slit down and open behind, the anthers opening by terminal pores or chinks; ovary superior, usually 2-celled with 1 ovule in each cell, the style simple with commonly 2-lobed stigma: fr. a caps., nut or drupe.

**POLYGALA**, L. MILKWORT. Between 500 and 600 species around the world, the following grown out-of-doors in warm regions and under glass in the N.—Technical characters as for the family: stamens 8: fr. a loculicidally dehiscent caps., the seeds usually hairy or with an aril. (*Polygala*: Greek *much milk*; some species reputed to increase the flow of milk.)

*P. myrtifolia*, L. Densely branched shrub 4–8 ft. high, the young branches pubescent: lvs. alternate, flat, oblong or oblong-ovate, to 1 in. long, glabrous: fls. in short terminal racemes, the 3 outer sepals green, ovate, small, the 2 inner ones very large, broadly ovate, greenish-white veined with purple, the lower petal or keel large and bearing a conspicuous crest. S. Afr.—Var. *grandiflora*, Hook. has fls.  $\frac{1}{2}$  in. and more long, of a rich purple. *P. Dalmaisiana*, Hort. (*P. myrtifolia* var. *Dalmaisiana*, Voss), is a hybrid between *P. myrtifolia* var. *grandiflora* and *P. oppositifolia* var. *cordata*, Harv. (*P. cordifolia*, Thunb.); its lvs. resemble *P. myrtifolia* in shape but may be opposite and alternate on the same plant: fls. bright purplish- or rosy-red. (Named for M. Dalmais, French gardener who raised the plant from seed in 1839.)

## 87. EUPHORBIACEÆ. SPURGE FAMILY

Herbs, shrubs, or trees, of very diverse habit, some being fleshy and cactus-like; about 250 genera and over 4,000 species widely distributed around the

world; many are cult. for ornament, others have valuable medicinal properties and some furnish edible parts.—Juice often milky: lvs. usually alternate and stipulate, sometimes with glands at base: monœcious or diœcious, the infl. various; fls. sometimes a cyathium (*O*, Fig. 10, page 387), i.e., the naked pistillate fl. is surrounded by several or numerous staminate fls., each consisting of a single stamen jointed on the pedicel, and all surrounded by an involucre; calyx and corolla present or absent, often different in staminate and pistillate fls., the parts free or rarely united; intrastaminal disk often present or reduced to glands; stamens as many or twice as many as sepals, or numerous, or reduced to 1, free or united; ovary superior, usually 3-celled, with 1 or 2 pendulous ovules in each cell, the styles free or united: fr. usually a 3-lobed caps. dehiscing elastically from a persistent axis, sometimes indehiscent and berry-like or drupaceous. —*Mercurialis annua*, L., is sometimes offered by seedsmen as a remedy; it is an annual to 2 ft. high, with opposite ovate to lanceolate serrate lvs., staminate fls. in spikes and pistillate fls. clustered in the axils. Eu. and Afr., but run wild in N. Amer.

- A. Fls. in cyathia, without true calyx.
- B. Involucre regular. .... 1. EUPHORBIA
- BB. Involucre irregular, protuberant on one side of base. .... 2. PEDILANTHUS
- AA. Fls. not in cyathia, with calyx.
- B. Number of stamens 2-4.
- C. Juice not milky: ovules 2 in each cell.
- D. Branches not flattened into phyllodia: lvs. present.
- E. Lvs. distichous on lateral branches, resembling pinnate lvs. 3. PHYLLANTHUS
- EE. Lvs. alternate, broad. .... 4. BREYNIA
- DD. Branches flattened into phyllodia bearing fls. along margins:
  - Lvs. obsolete. .... 5. XYLOPHYLLA
- CC. Juice milky: ovules 1 in each cell. .... 6. SAPIUM
- BB. Number of stamens 5 to many.
- C. Petals present, at least in staminate fls.
- D. Lvs. not variegated, veining palmate: juice milky. .... 7. ALEURITES
- DD. Lvs. variegated, veining pinnate: juice somewhat milky. .... 8. CODIÆUM
- CC. Petals absent.
- D. Lvs. palmately lobed or 3-foliolate.
- E. Juice not milky: lvs. peltate. .... 9. RICINUS
- EE. Juice milky: lvs. not peltate.
- F. Plant a large tree: stamens united into a column. .... 10. HEVEA
- FF. Plant an herb or shrub: stamens free. .... 11. MANIHOT
- DD. Lvs. simple.
- E. Ovules 1 in each cell: lvs. dentate. .... 12. ACALYPHA
- EE. Ovules 2 in each cell: lvs. entire. .... 13. DAPHNIPHYLLUM

1. **EUPHORBIA**, L. SPURGE. Upright or prostrate herbs or shrubs, often cactus-like, of very diverse appearance, some planted in the open, others under glass, one a popular florist's plant; probably over 1,000 species mostly in temp. regions, if the genus is accepted broadly.—Juice milky and acrid: sts. fleshy and almost leafless or herbaceous or woody: lvs. alternate or opposite, simple, entire or dentate: fls. in cyathia borne in terminal cymes in the axils of the lvs. or in the axils of dichotomous twigs; involucre with 4-5 entire or lacinate lobes, regular or nearly so, resembling a calyx, with glands between the lobes sometimes bearing petal-like appendages; staminate fls. numerous in the involucre, each fl. consisting of a single stamen jointed on its pedicel, usually subtended by minute bracts; pistillate fl. solitary in the middle of the involucre, becoming exerted by lengthening of the pedicel, consisting of a 3-celled ovary sometimes subtended by 3 small scales, with solitary ovule in each cell, 3-parted style free or more or less united: caps. separating into 3 carpels, each splitting elastically into 2 valves. (*Euphorbia*: old classical name.)—Many of the cactus-like forms may be planted on the southern borders; they can be distinguished from cacti by the milky juice. The closely related genus *Synadenium*, Boiss., differs in having the glands of the involucre united to form a ring around the lobes. *S. Grantii*, Hook., native in trop. Afr., is

cult. in W. Indies; it is a tree-like shrub to 12 ft. high, with thick obovate spatulate lvs. to 6 in. long, fls. in dichotomous cymes with red involucre.

- A. Sts. armed with spines. . . . . 1. *E. splendens*  
 AA. Sts. unarmed.  
 B. Glands of involucre with petal-like appendages.  
 c. Plant an herb: involucreal appendages white.  
 d. Lvs. ovate, the upper margined with white. . . . . 2. *E. marginata*  
 dd. Lvs. oblong to linear, not white-margined. . . . . 3. *E. corollata*  
 cc. Plant a shrub: involucreal appendages bright scarlet. . . . . 4. *E. fulgens*  
 BB. Glands of involucre without petal-like appendages.  
 c. Fls. in cymes: upper lvs. red or white, at least at base.  
 d. Upper lvs. uniformly bright red (white or pink in some vars.):  
 plant a shrub. . . . . 5. *E. pulcherrima*  
 dd. Upper lvs. blotched with red and white: plant an annual herb. . . . . 6. *E. heterophylla*  
 cc. Fls. in umbels: upper lvs. green or yellow.  
 d. Lvs. narrowly linear. . . . . 7. *E. Cyparissias*  
 dd. Lvs. lanceolate or broader.  
 E. Plant annual: lvs. mostly opposite. . . . . 8. *E. Lathyrus*  
 EE. Plant perennial: lvs. mostly alternate.  
 F. Glands of involucre oval, entire: plant erect, forming a  
 hemispherical clump. . . . . 9. *E. epithymoides*  
 FF. Glands of involucre 2-horned or crescent-shaped: plant  
 prostrate. . . . . 10. *E. Myrsinites*

1. *E. splendens*, Bojer. CROWN-OF-THORNS. Somewhat climbing, the thick sts. becoming 3-4 ft. long and armed with stout spines  $\frac{1}{2}$ -1 in. long: lvs. few, mostly on the young growth, obovate to oblong-spatulate, 1  $2\frac{1}{2}$  in. long, mucronate, thin: fls. nearly all the year but mostly in winter, in long-peduncled dichotomous cymes, each cyathia closely subtended by 2 broadly ovate bright red bracts. Madagascar.

2. *E. marginata*, Pursh (*E. variegata*, Sims. *Lepadenia marginata*, Niewl.). SNOW-ON-THE-MOUNTAIN. Annual to 2 ft. high, the sts. usually pubescent: lvs. ovate to oblong, 1-3 in. long, entire, sessile, light green, the upper with conspicuous white petal-like margins: involucre usually pubescent, the glands with white petal-like appendages: caps. depressed-globose, about  $\frac{1}{4}$  in. diam., commonly pubescent. Plains Minn. to Colo. and Tex.

3. *E. corollata*, L. (*Tithymalopsis corollata*, Klotzsch & Garcke). FLOWERING SPURGE. Slender perennial to 3 ft. high, diffusely branched above, usually glabrous: lvs. oblong or oblong-spatulate to linear, 1-2 in. long, entire, sessile or short-petioled, the lower alternate, the floral lvs. whorled: involucreal glands with white petal-like appendages: caps. subglobose, about  $\frac{1}{6}$  in. diam., glabrous. Dry soil, E. U. S.

4. *E. fulgens*, Karw. (*E. jacquinæflora*, Hook.). SCARLET PLUME. Small glabrous shrub to about 4 ft. high, with slender recurved branches: lvs. lanceolate, 2-3 in. long, long-petioled: fls. in small axillary cymes in winter, the involucreal glands with bright scarlet petal-like appendages. Mex.—Often sold for cut-fls.

5. *E. pulcherrima*, Willd. (*Poinsettia pulcherrima*, Graham). POINSETTIA. Popular greenhouse winter-flowering shrub 2-10 ft. high, or grown out-of-doors in the S.: lvs. ovate-elliptical to lanceolate, 3-6 in. long, entire or sinuate-toothed or lobed, pubescent beneath, the upper narrower, mostly entire, and bright vermilion-red: involucre greenish, about  $\frac{1}{4}$  in. across, bearing a large yellow gland on one side. Trop. Mex., Cent. Amer.—There are forms in which the floral lvs. are white or pink.

6. *E. heterophylla*, L. (*Poinsettia heterophylla*, Klotzsch & Garcke). MEXICAN FIRE-PLANT. Nearly glabrous annual to 3 ft. high: lvs. very variable, from ovate to linear, entire, sinuate-toothed or fiddle-shaped, slender-petioled, the upper red at base or blotched with red and white: involucre small, with 1 or 2 glands: caps. glabrous or slightly pubescent, about  $\frac{1}{4}$  in. diam. Ill. to Fla. and Tex., south to Peru.

7. *E. Cyparissias*, L. (*Tithymalus Cyparissias*, Hill). CYPRESS SPURGE. Glabrous perennial cult. in old gardens and cemeteries, with erect sts. leafy above, to 1 ft. high: lvs. linear,  $\frac{1}{2}$  1 in. long, entire, the floral lvs. whorled and ovate-cordate: fls. in many-rayed umbels: involucre with 4 unappendaged crescent-shaped glands: caps. subglobose,  $\frac{1}{6}$  in. or less across. Eu.; naturalized from Mass. to Va. and Colo.

8. *E. Lathyrus*, L. (*Tithymalus Lathyrus*, Hill). CAPER SPURGE. Glabrous and glaucous annual to 3 ft. high, sometimes planted to drive away moles or gophers: lvs. mainly opposite and decussate, those of the st. lanceolate,  $1\frac{1}{2}$ -5 in. long, subcordate, sessile, entire, the floral lvs. ovate or ovate-lanceolate: fls. in 3 4-rayed

umbels; involucre with 4 unappendaged crescent-shaped glands which are prolonged into 2 short horns: caps. subglobose, about  $\frac{1}{2}$  in. diam. (Lathyrus: ancient classical name.) Eu.; naturalized in E. U. S. and Calif.

9. *E. epithymoides*, L. (*E. polychroma*, Kern.). Erect perennial, the many sts. forming a hemispherical clump about 1 ft. high: lvs. oblong, 2 in. long, the floral lvs. yellow at flowering time: fls. in 5-rayed umbels; involucre with oval entire glands. E. Eu.

10. *E. Myrsinites*, L. Prostrate biennial or perennial with fleshy sts. and fleshy, glaucous, concave, sessile lvs. arranged in close spirals: fls. in 7-12-rayed umbel; involucre yellow with crescent-shaped or 2-horned glands. (Myrsinites: pre-Linnean substantive name.) Medit. region.

2. **PEDILANTHUS**, Neck. About 30 species of cactus-like shrubs native in trop. Amer.—Technical characters as in *Euphorbia*, but differing in the irregular involucre which has a short spur at base on upper side containing the glands. (Pedilanthus: Greek *slipper-flower*.)

*P. tithymaloides*, Poit. (*Euphorbia tithymaloides*, L.). REDBIRD-CACTUS. SLIPPER-FLOWER. JEW-BUSH. To 6 ft. high, the sts. often zigzag: lvs. ovate to ovate-lanceolate, 2-4 in. long, acute, the midrib keeled below and dentate: fls. in dense terminal cymes, the bright red or purple involucre about  $\frac{1}{2}$  in. long, glabrous except the terminal lobe slightly ciliate, stamens and style exserted: caps. about  $\frac{1}{4}$  in. long. Fla. to Venezuela.—There are vars. with lvs. bordered white.

3. **PHYLLANTHUS**, L. Shrubs, trees, or herbs, of over 50 species of wide distribution, two grown in warm regions for the frs. which are made into preserves.—Lvs. alternate, entire, often distichously arranged on the lateral branches and resembling pinnate lvs.: fls. monœcious, apetalous, in lateral panicles or solitary, often a pistillate and staminate fl. together in axils of lvs.; sepals 4-6, imbricated; intrastaminal disk present; stamens 3 or 4; ovary 3-4-celled with 2 ovules in each cell, each of the 3 styles usually 2-cleft: fr. a berry or caps. (Phyllanthus: Greek *leaf-flower*; the fls. of some species apparently borne on the lvs.)

Sepals and stamens 4.....1. *P. acidus*  
 Sepals 5-6; stamens 3.....2. *P. Emblica*

1. *P. acidus*, Skeels (*P. distichus*, Muell. Arg. *Cicca disticha*, L. *C. acida*, Merr.). OTAHEITE-GOOSEBERRY. GOOSEBERRY-TREE. Tree to 20 ft. high, older branches with large scars where foliage-branches have fallen: lvs. distichous, ovate, 2-3 in. long, acute: fls. reddish, minute, in many-fld. panicles below the foliage or sometimes in the lf.-axils; sepals 4; stamens 4, free: berry depressed-globose,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, angled. India, Madagascar; run wild in W. Indies and Fla.

2. *P. Emblica*, L. (*P. mimosæfolius*, Salisb.). EMBLIC. MYROBOLAN. Much-branched shrub or tree to 30 ft. high: lvs. distichously arranged on the slender branchlets so as to resemble pinnate lvs., linear-oblong,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, obtuse, nearly sessile: fls. yellow, small, short-pedicelled, in fascicles in the axils of the lower lvs.; sepals 5-6; stamens 3, the filaments connate: fr. fleshy, depressed-globose,  $\frac{3}{4}$ -1 in. diam., obscurely 6-lobed. (Emblia: from the Arabic name.) Trop. Asia.

4. **BREYNIA**, Forst. About 15 species of shrubs or trees native in trop. Asia, Afr., and Pacific Isls., one planted for ornamental hedges in warm regions and under glass in the N.—Lvs. alternate, entire: fls. monœcious, apetalous, solitary in the lf.-axils or the staminate few together; calyx of staminate fls. turbinate and truncate, of pistillate with 6 broad imbricated lobes; stamens 3, the filaments united; ovary 3-celled with 2 ovules in each cell: fr. a berry. (Brey-nia: after J. P. Breyn, 1637-1697, German botanist.)

*B. nivosa*, Small (*Phyllanthus nivosus*, Bull). SNOW-BUSH. Shrub of loose habit, with dark-red somewhat zigzag branches: lvs. oval or ovate, 1-2 in. long, green and white, or variegated with red and pink in a var.: fls. greenish, small, long-pedicelled: fr. depressed,  $\frac{1}{2}$  in. or less across. S. Sea Isls.; run wild in W. Indies and Fla.



5. **XYLOPHYLLA**, L. About 10 species of shrubs native to the W. Indies and Brazil.—Branches lf.-like, flattened into phyllodia, the true lvs. obsolete or sometimes present in seedlings: fls. monœcious, apetalous, in clusters in the serratures of the phyllodia; sepals 5-6; stamens usually 3 and united into a column; ovules 2 in each cell: fr. a caps. (Xylophyl-la: Greek *woody-leaf*.)

- Phyllodia broadly lanceolate, short-acute or obtuse, the fls. close together in indistinct notches. . . . . 1. *X. speciosa*  
 Phyllodia lanceolate to linear-lanceolate, acuminate, the fls. rather far apart in truncate notches. . . . . 2. *X. angustifolia*

1. **X. speciosa**, Sweet (*Phyllanthus speciosus*, Jacq. *P. latifolius*, Hort.). Shrub or small tree to 20 ft. high: flowering branches or phyllodia broadly lanceolate,  $1\frac{1}{2}$ -3 in. long,  $\frac{1}{2}$ -1 in. broad, obtuse or short-acute: fls. whitish, borne in indistinct notches which are close together near ends of branches. Jamaica.

2. **X. angustifolia**, Sw. (*Phyllanthus angustifolius*, Sw.). Shrub to 10 ft. high: phyllodia lanceolate to linear-lanceolate, 2-4 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, acuminate: fls. reddish, borne in truncate distant notches. Jamaica.

6. **SAPIUM**, P. Br. Trees and shrubs native in the tropics of both hemispheres, of nearly 100 species, several furnishing rubber and one grown for ornament and for the waxy seed-covering which is used for candles, soap and cloth-dressing.—Juice milky and poisonous: lvs. alternate or rarely opposite, entire or sometimes dentate, glabrous, the petiole with 2 glands at apex: fls. monœcious, apetalous, in terminal or lateral spikes, the staminate usually 3 under each bract and the pistillate solitary at the base of the spikes, the bracts with 2 glands; calyx 2-3-lobed; stamens 2-3, the filaments free; disk wanting; ovary 2-3-celled with 1 ovule in each cell, the 2-3 styles free or united at base: fr. a more or less fleshy caps., commonly loculicidally dehiscent. (Sa-pium: classical name used by Pliny.)

**S. sebiferum**, Roxb. (*Stillingia sebifera*, Michx.). CHINESE TALLOW-TREE. VEGETABLE TALLOW. Tree to 40 ft. or more high: lvs. rhombic-ovate, 1-3 in. long, acuminate, broadly cuneate or nearly truncate at base, on long slender petioles, turning red in age: fls. in continuous terminal spikes 2-4 in. long: caps. 3-lobed, about  $\frac{1}{2}$  in. across, the large white seeds adhering to the central column. China, Japan; naturalized S. C. to Fla. and La.

7. **ALEURITES**, Forst. Four species native in E. Asia and Pacific Isls., yielding oil and sometimes grown as shade trees.—Juice milky: lvs. alternate, large, 5-7-veined from the base, entire or 3-7-lobed, the long petioles with 2 glands at apex: usually monœcious; fls. in lax terminal paniced cymes; calyx splitting into 2-3 valvate lobes at flowering time; petals 5, longer than the calyx; stamens 8-20, inserted on a conical receptacle, in 1-4 rows, the 5 outer opposite the petals and alternating with 5 glands of the disk; ovary 2-5-celled with 1 ovule in each cell, the style divided into 2 thick linear branches: fr. an indehiscent drupe. (Aleuri-tes: Greek for *farinose* or *floury*.)

- Pubescence stellate: ovary 2-celled. . . . . 1. *A. moluccana*  
 Pubescence not stellate: ovary 3-5-celled. . . . . 2. *A. Fordii*

1. **A. moluccana**, Willd. (*A. triloba*, Forst.). CANDLENUT. CANDLE-BERRY-TREE. VARNISH-TREE. Large tree with long spreading or pendulous branches: lvs. ovate, to 8 in. long, acuminate, entire or repand-dentate, often with 3-7 short acuminate lobes, with rusty stellate pubescence beneath when young and persisting on the veins and petiole: fls. small, white, in rusty-pubescent paniced cymes 4-6 in. long; ovary 2-celled: fr. fleshy, glabrous, slightly 4-angled, about 2 in. across, with large rough seeds. Probably native in Malay region, but now widely distributed in the tropics.

2. **A. Fordii**, Hemsl. CHINA WOOD-OIL-TREE. Tree to 25 ft. high, with glabrous branches: lvs. ovate, 3-5 in. long, acuminate, truncate or cordate at base, sometimes 3-lobed, loosely pubescent beneath and becoming glabrate: fls. before the lvs., in paniced cymes, reddish-white; petals 1 in. or more long; ovary 3-5-celled:

fr. subglobose or top-shaped, 2-3 in. diam., glabrous, the seeds rough. (Named for C. Ford, supt. botanic garden in Hongkong.) Cent. Asia.

8. **CODIÆUM**, Juss. **CROTON**. Trees and shrubs of Malaya and Pacific Isls., of 6 species, one of which is widely cult. out-of-doors or under glass for the handsome variegated lvs.—Lvs. alternate, simple or rarely lobed, entire, leathery and rather thick, glabrous, pinnately-veined, petioled: fls. mostly monœcious, small, in elongated racemes solitary or 2 together in the axils of the upper lvs., the staminate clustered under the bracts, the pistillate solitary; calyx with 5 (rarely 3-6) imbricated lobes; petals 5-6, small, lacking in pistillate fls.; disk of 5-15 glands; stamens 15-30 or more, inserted on receptacle, the filaments free; ovary 3-celled with 1 ovule in each cell, the styles distinct or slightly united at base: fr. a globose caps. dehiscent into 2-valved cocci. (Codæ-um: probably from Greek for *head*, the lvs. being used for wreaths.)

**C. variegatum**, Blume, var. **pictum**, Muell. Arg. (*Croton variegatus*, L.) Glabrous shrub or small tree: lvs. ovate-lanceolate to linear, marked with white, yellow, or red, entire or lobed: staminate racemes to 10 in. long: caps. white, about  $\frac{1}{2}$  in. across.—The wild form, native from Java to Australia and S. Sea Isls., is rarely cult.; it has green obovate-oblong entire lvs. Codiaëums are widely cult. under the name of "crotons"; they vary greatly and very many Latin- and English-named forms are in the trade. The lvs. vary from very broadly lanceolate to narrowly linear, from entire to cut almost to the midrib, sometimes with lf.-like apical appendage, margins of lvs. crisped or whole lf. spirally twisted, and with various forms and combinations of color variegation.

9. **RICINUS**, L. One variable species probably native in trop. Afr., but now widely distributed, planted for bold foliage effects and the seeds yielding oil.—Annual herb or becoming a small tree in the tropics: lvs. alternate, large, peltate, palmately 5-11-lobed, the lobes serrate, the petioles with conspicuous glands: fls. monœcious, apetalous, in terminal panicles, staminate fls. below and pistillate above; calyx 3-5-parted, valvate; disk lacking; stamens very numerous, the filaments much branched; ovary 3-celled with 1 ovule in each cell, the plumose styles deep red: fr. a spiny caps. dehiscent into 3 2-valved cocci; seeds glabrous, variously marked and colored. (Ric-inus: classical Latin name.)

**R. communis**, L. **CASTOR-BEAN**. **CASTOR-OIL-PLANT**. **PALMA CHRISTI**. Tree to 40 ft. high with an herbaceous st. or when grown as an annual 3-15 ft.: lvs. to 3 ft. across, parted beyond middle into ovate-oblong or lanceolate, acuminate, glabrous lobes: panicles erect, 1-2 ft. or more long, flowering from base: caps.  $\frac{1}{2}$ -1 in. long, covered with dark brown soft spines.—Runs into numbers of forms distinguished chiefly by the color of plant and lvs., glands of the petiole, size and processes of the caps., and markings of the seed.

10. **HEVEA**, Aubl. Tall trees, of about 17 species in N. Brazil, particularly in the Amazon region, one sometimes planted for ornament in trop. countries and also an important source of Para rubber.—Juice milky: lvs. alternate or subopposite at ends of shoots, of 3 entire pinnate-veined lfts., the long petioles glandular at apex: fls. monœcious, apetalous, small, in paniced cymes; calyx 5-toothed or -lobed; disk of 5 free or united glands; stamens 5-10, the filaments united into a column and anthers sessile; ovary 3-celled with 1 ovule in each cell, the 2-lobed stigma nearly sessile: fr. a large caps. dehiscent into 2-valved cocci. (He-vea: from the Brazilian name.)

**H. brasiliensis**, Muell. Arg. **PARA RUBBER** or **CAOUTCHOUC-TREE**. Tree to 60 ft. high: lfts. elliptic to elliptic-lanceolate, 2 in. to 2 ft. long, acuminate, narrowed or cuneate at base, glabrous, reticulate: panicles pyramidal, shorter than lvs., the branches finely pubescent: fls. white-tomentose; stamens 10, in 2 series. Amazon region.

11. **MANIHOT**, Adans. Herbs, shrubs or trees, of nearly 150 species in Amer., mostly in Brazil, some yielding rubber and one grown for the starch in the fleshy roots from which tapioca and other food products are manufactured.—Juice milky: lvs. alternate, entire or deeply 3-11-lobed, petioled or rarely sessile: fls. monœcious, apetalous, large, in terminal or axillary racemes or panicles; calyx campanulate, shortly or deeply 5-lobed, often colored; disk glandular; stamens 10 in 2 series, the filaments free; ovary 3-celled with 1 ovule in each cell, the styles united at base: fr. a caps. dehiscing into 2-valved cocci. (Man-ihot: native Brazilian name.)

**M. utilissima**, Pohl. BITTER CASSAVA. MANIOC. TAPIOCA-PLANT. An herbaceous shrub to 9 ft. high, with fleshy elongated tuberous roots: lvs. usually deeply 3-7-parted into spatulate- or linear-lanceolate acuminate lobes 3-6 in. long, glabrous, glaucous beneath and minutely puberulent on veins: fls. less than  $\frac{1}{2}$  in. long, in panicles: caps. globose,  $\frac{1}{2}$  in. across, with 6 winged angles. Trop. Brazil.

12. **ACALYPHA**, L. COPPER-LEAF. About 250 species of herbs or shrubs native in the tropics and subtropics of both hemispheres, grown as foliage plants in the greenhouse and for bedding and for hedges in the S.—Lvs. alternate, dentate, 3-5-nerved from the base or pinnately veined, long-petioled: fls. monœcious or rarely diœcious, apetalous, in axillary or terminal spikes or racemes; staminate fls. in axils of minute bracts, with 4-parted calyx and 8-16 free stamens; pistillate fls. subtended by foliaceous bracts, with 3-5 sepals and 3-celled ovary with 1 ovule in each cell and free often fringed styles: fr. a caps. dehiscing into 2-valved cocci. (Acalypha: old Greek name for nettle.)

Spikes  $\frac{1}{2}$ -1 in. wide: lvs. green.....1. *A. hispida*  
Spikes  $\frac{1}{8}$ - $\frac{1}{4}$  in. wide: lvs. mostly mottled with red and purple.....2. *A. Wilkesiana*

1. *A. hispida*, Burm. f. (*A. Sanderi*, N. E. Br.). CHENILLE-PLANT. REDHOT-CATTAIL. Diœcious shrub to 15 ft. high: lvs. green, broadly ovate, 4-8 in. long, acute or acuminate, rounded at base, the long petiole and veins of lf. pubescent, coarsely toothed: pistillate spikes drooping, dense, cylindrical, up to 18 in. long and  $\frac{1}{2}$ -1 in. wide, the long branched styles bright red or purple (or creamy-white in a var.); ovary densely villous. E. Indies.

2. *A. Wilkesiana*, Muell. Arg. (*A. tricolor*, Seem.). Monœcious shrub to about 15 ft. high: lvs. elliptic or ovate, 4-8 in. long, shortly acuminate, rounded or shortly acute at base, glabrous except on the veins and petioles, dentate, bronzy-green variously mottled with shades of red and purple: spikes slender, 8 in. or less long and  $\frac{1}{8}$ - $\frac{1}{4}$  in. wide, reddish, the pistillate bracts mostly broadly triangular and prominently toothed. (Bears the name of Admiral Chas. Wilkes, 1801-1877, American scientist and explorer.) S. Sea Isls., and now widely cult. both under glass and in warm countries in the open for the colored and variegated foliage; the bracts of the pistillate fls. are either extremely variable or else there are several species in cult. and passing under one name.—Known to the trade under the following names: Var. *Macafeana*, W. Miller, with red lvs. marked with crimson and bronze; var. *marginata*, W. Miller, lvs. margined with crimson; var. *macrophylla*, N. Taylor, not *A. macrophylla*, HBK., with larger russet-brown lvs.; var. *musica*, W. Miller, lvs. with orange and red markings. Perhaps not specifically distinct is *A. Godseffiana*, Mast., with green lvs. margined with cream-color, which in var. *heterophylla* are spatulate and ragged-looking, sometimes reduced to shreds, with variously sinuate-dentate margins.

13. **DAPHNIPHYLLUM**, Blume. Evergreen shrubs and trees, of about 25 species in S. Asia, one sometimes planted in warm regions.—Lvs. alternate or subverticillate, entire or revolute, long-petioled, exstipulate, leathery and smooth, glaucous below: fls. diœcious, apetalous, in axillary racemes which are somewhat umbellate at apex; calyx of 3-6 more or less united imbricate sepals or obsolete and ovary surrounded by 5-10 staminodia; stamens 6-12, the short filaments free; ovary imperfectly 2-celled with 2 ovules in each cell, the 1-2 styles very short or none, stigmas 2: fr. a 1-seeded drupe.

(Daphniphyllum: Greek *laurel leaf*, from the similarity of the lvs.)— Sometimes separated into the monotypic family Daphniphyllaceæ.

**D. macropodium**, Miq. (*D. glaucescens*, Franch. & Sav.). Shrub or small tree to 10 ft. or more high, with red smooth twigs; lvs. oblong-elliptic to obovate-lanceolate, 3-7 in. long, apiculate, cuneate or rounded at base, on petioles 1 in. or more long; racemes 1-4 in. long; calyx lacking; pistillate fls. with 10 staminodia; stamens 8-10; drupe globose, black with a bloom, crowned by the persistent stigmas. China, Japan.

## 88. BUXACEÆ. BOX FAMILY

About 6 genera and 35 species of herbs, shrubs and trees of wide distribution, mostly in warm regions, a few planted for ornament.—Often united with Euphorbiaceæ, but differing technically in the raphe of the pendulous ovules being directed away from rather than toward the axis of the ovary, or the ovules erect or ascending: also distinguished by the juice not being milky and hypogynous disk wanting: lvs. opposite or alternate, simple: fls. monœcious, apetalous; calyx 4-12-parted or none; stamens 4 or more, free; ovary superior, 2-4-, usually 3-celled with 1-2 ovules in each cell: fr. a caps. or drupe.

Plant erect: lvs. opposite, entire.....1. *Buxus*

Plant procumbent; lvs. alternate or crowded at ends of branchlets,  
coarsely dentate in ours. . . . . 2. *PACHYSANDRA*

1. **BUXUS**, L. BOX-TREE. Evergreen much-branched shrubs, of about 30 species in both the Old and New World, two species grown for ornament, hedges and edging.—Lvs. opposite, leathery, entire, short-petioled, penninerved: fls. in axillary clusters or spikes; staminate fls. lateral in infl., of 4 imbricated sepals and 4 stamens opposite the sepals, the thick filaments free; pistillate fls. terminal, of 6 imbricated sepals and 3-celled ovary with 2 ovules in each cell and 3 short styles: fr. an ovoid loculicidally dehiscent caps., 3-pointed because of the persistent styles; seeds shining, black. (Bux-us: ancient Latin name.)

Branches minutely pubescent, angled or slightly winged.....1. *B. sempervirens*

Branches glabrous, conspicuously winged.....2. *B. microphylla*  
[var. *japonica*]

1. **B. sempervirens**, L. COMMON BOX. Wide-spreading shrub or small tree to 25 ft. high; branches quadrangular or slightly winged, minutely pubescent: lvs. oval to oblong-lanceolate, broadest about or below the middle,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, obtuse or emarginate at apex, shining dark green above and pale beneath, the short petiole minutely pubescent: fls. pale green with yellow anthers, in early spring. Eu., N. Afr., W. Asia.—Runs into many forms, of dwarf (var. *suffruticosa* or *nana*) or arborescent habit, with lvs. variegated or edged with yellow or silvery-white, and with lvs. of varying shape and size.

2. *B. microphylla* var. *japonica*, Rehd. & Wils. (*B. japonica*, Muell. Arg.). Spreading shrub to 6 ft. high; branches glabrous, quadrangular and conspicuously winged: lvs. obovate or rounded-obovate, broadest above middle,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, obtuse or emarginate at apex, cuneate at base, light green, petioles glabrous: fls. in early spring. China, Japan.—The species is not in cult.: it is a much lower shrub, 3 ft. or less high, and the lvs. 1 in. or less long.

2. **PACHYSANDRA**, Michx. Two procumbent herbs or subshrubs, 1 native in E. N. Amer., the other in Japan and grown as a ground-cover.—Branches ascending, leafy above: lvs. alternate or clustered at ends of branches, petioled, usually coarsely toothed, 3-nerved from base, evergreen or deciduous: fls. in axillary or terminal spikes, staminate fls. above, pistillate below; sepals 4, imbricated, or variable in pistillate fls.; stamens 4, opposite sepals, the thick filaments free and exerted; ovary 3-celled with 2 ovules in each cell, with 3 spreading styles: fr. a dehiscent 3-pointed caps. or drupaceous. (Pachysan-dra: Greek *thick stamens*.)

**P. terminalis**, Sieb. & Zucc. Evergreen, to 8 in. high and forming a dense mass several ft. across: lvs. obovate, 1-3 in. long, coarsely and bluntly toothed



above middle, entire and cuneate at base, glabrous: fls. white, in terminal spikes 1 in. or less long, in spring. Japan.—There is a var. with lvs. variegated white.

## 89. LIMNANTHACEÆ. LIMNANTHES FAMILY

Two genera and 6 species of herbs native in N. Amer., one of which is sometimes grown as a garden annual.—Lvs. alternate, dissected or pinnate, exstipulate: fls. bisexual, regular, solitary on long axillary peduncles; sepals 3-5, valvate, persistent; petals 3-5, separate, alternating with as many small glands; stamens twice as many as petals, distinct; ovary of 3-5 nearly distinct 1-ovuled carpels, with single style arising in center and 3-5 stigmas: fr. at length separating from a very short axis into 3-5 indehiscent achenes.

**LIMNANTHES**, R. Br. Four species in W. N. Amer., with the technical characters of the family, the parts of the fl. being in 5's. (Limnanth-es: from Greek for *marsh flower*, referring to the habitat.)

**L. Douglasii**, R. Br. (*Flærkea Douglasii*, Baill.). MEADOW FOAM. Spreading herb to 1 ft. high, branching from base: lvs. glabrous, yellowish-green, pinnate, the lfts. sharply lobed or parted: fls. fragrant,  $\frac{3}{4}$ -1 in. across, the white or sometimes roseate petals yellowish toward the base, notched at apex: fr. smooth or slightly corrugated. (Douglasii: after David Douglas, 1798-1834, Scotch botanist, explorer in W. N. Amer.) Calif. to Ore.

## 90. ANACARDIACEÆ. CASHEW FAMILY

Trees or shrubs with resinous bark, of about 60 genera and 400 species, most abundant in the tropics but a few extending into the temp. zone; in both eastern and western hemispheres.—Lvs. alternate, rarely opposite, simple or compound: fls. imperfectly diœcious or bisexual, usually regular; calyx 3-7-cleft; petals 3-7, rarely 0; disk usually annular; stamens as many or twice as many as the petals, rarely many, inserted at base of disk, filaments separate; ovary 1-6-celled with 1 ovule in each cell; styles 1-6: fr. usually a drupe, rarely dehiscent.

|                                     |               |
|-------------------------------------|---------------|
| Lvs. simple.                        | 1. ANACARDIUM |
| Stamens 7-10.....                   |               |
| Stamens 1-5.....                    |               |
| Plant a shrub.....                  | 2. COTINUS    |
| Plant a large tree.....             | 3. MANGIFERA  |
| Lvs. pinnate or composed of 3 lfts. |               |
| Ovary 4-5 celled.....               | 4. SPONDIAS   |
| Ovary 1-celled.                     |               |
| Petals 0.....                       | 5. PISTACIA   |
| Petals 5.....                       |               |
| Stamens 10.....                     | 6. SCHINUS    |
| Stamens 5.....                      | 7. RHUS       |

**1. ANACARDIUM**, L. Eight trop. American species of trees or shrubs, one widely cult. in the tropics for the nuts.—Lvs. alternate, petioled, simple, entire, coriaceous: fls. in terminal branching panicles, polygamous; calyx 5-parted, deciduous; petals 5, very narrow; stamens 7-10, all or only a few fertile; ovary 1-celled, sessile; style 1: fr. kidney-shaped, borne on a greatly enlarged receptacle. (Anacar-dium: from Greek for *like* and *heart*, referring to the heart-shaped nut.)

**A. occidentale**, L. CASHEW. Spreading evergreen tree to 40 ft., with milky juice: lvs. oblong-oval or obovate, rounded or sometimes emarginate at apex, 4-8 in. long, 2-4 in. wide: panicles 6-10 in. long; fls. yellowish-pink, about  $\frac{1}{2}$  in. across: fr. kidney- or heart-shaped, about 1 in. long, with edible kernel; receptacle fleshy, to 3 $\frac{1}{2}$  in. long, bright yellow or red, edible (called the cashew-apple). Trop. Amer. but naturalized in all trop. countries.

**2. COTINUS**, Adans. SMOKE-TREE. Two species of shrubs or small trees, 1 in N. Amer. and 1 in S. Eu. to Cent. Asia, one grown for its feathery panicles and attractive foliage.—Lvs. entire, slender-petioled, ovate to ob-

ovate, without stipules: fls. polygamous, in large loose terminal panicles, small, greenish or yellowish, the pedicels of sterile fls. elongating and clothed with spreading hairs; petals 5, twice as long as 5-parted calyx; stamens 5; ovary 1-celled with 3 lateral styles: drupe small, compressed, oblique-obovate. (Cotinus: ancient Greek plant name of doubtful application.)

**C. Coggygria**, Scop. (*Rhus Cotinus*, L.). Spreading dense shrub to 15 ft.: lvs. oval or obovate,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. long, glabrous: panicles to 8 in. long, densely plumose, usually purplish, blooming June–July: frs. few, about  $\frac{1}{8}$  in. long. (Coggyg-ria: ancient Greek name.) S. Eu. to Cent. China and Himalayas.—There are pendulous vars. and one in which the panicles have dark purple hairs.

**3. MANGIFERA**, L. Large trees comprising about 30 species from trop. Asia, one of which is widely grown throughout the tropics for its edible fr.—Lvs. alternate, entire, petioled, coriaceous: fls. in branching terminal panicles, small, pedicelled, polygamous; calyx 4–5-parted, deciduous; petals 4–5, free or adnate to the disk; stamens 1–5, usually only 1 or 2 fertile; ovary 1-celled with lateral style: drupe large and fleshy, with a compressed fibrous stone. (Mangif-era: from *mango*, vernacular name of one species, and Latin to bear.)

**M. indica**, L. MANGO. Large spreading evergreen tree up to 90 ft. high: lvs. lanceolate, 6–16 in. long, rigid, deep green, almost glossy, on petioles 1–4 in. long swollen at base: panicles 1 ft. or more long; fls. pinkish-white; only 1 fertile stamen: fr. variable in shape, 2–6 in. long, greenish, yellowish or reddish. N. India, Burma, Malaya.

**4. SPONDIAS**, L. Trop. trees cult. for their edible frs., of about 12 species widely distributed.—Lvs. usually clustered near the ends of the branchlets, alternate, odd-pinnate: fls. small, short-pedicelled, in racemes or panicles; calyx small, deciduous, 4–5-cleft; petals 4–5, spreading; stamens 8–10; ovary sessile, free, 4–5-celled; styles 4–5: fr. a fleshy drupe. (Spon-dias: Greek name used by Theophrastus for the plum, which its frs. resemble.)

Lfts. 1– $1\frac{1}{2}$  in. long.....1. *S. purpurea*

Lfts.  $2\frac{1}{2}$ –4 in. long.

Rachis of lf. pubescent; veins branching at end.....2. *S. Mombin*

Rachis of lf. glabrous; veins not branching.....3. *S. cytherea*

**1. S. purpurea**, L. (*S. Mombin*, Auth.). SPANISH-PLUM. RED MOMBIN. Spreading tree to 30 ft. high: lvs. 5–10 in. long; lfts. 7–23, obovate or oblong,  $1-1\frac{1}{2}$  in. long, acute or bluntish, entire or shallowly toothed: fls. in unbranched axillary panicles about  $\frac{1}{2}$  in. long, small, greenish or purplish: fr. obovoid, from 1–2 in. long, varying from yellow to deep red, the stone large and very hard. Trop. Amer.

**2. S. Mombin**, L. (*S. lutea*, L.). HOG-PLUM. YELLOW MOMBIN. Graceful tree to 60 ft. high: lvs. 8–12 in. long; rachis pubescent; lfts. 7–17, ovate-lanceolate,  $2\frac{1}{2}$ –4 in. long, acuminate, subentire, veins branching near edges of lfts.: fls. in large terminal panicles  $\frac{1}{2}$ –1 ft. or more long, small, yellowish-white: fr. ovoid, 1–2 in. long, yellow, with large stone. (Mombin: a native American name.) Cosmopolitan in tropics.

**3. S. cytherea**, Sonn. (*S. dulcis*, Forst.). OTAHEITE-APPLE. VI. AMBARELLA. Spreading graceful tree to 60 ft. high: lvs. 8–15 in. long; lfts. 11–13, oval-oblong, acuminate,  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. long, entire or slightly crenate; veins almost parallel, unbranching: fls. in terminal panicles 8–12 in. long, small, greenish-white: fr. oval or obovoid, golden-yellow, up to 3 in. long and 1–3 in. diam., with large stone. (Cytherea: one of the names of Venus.) Society Isls.

**5. PISTACIA**, L. About 20 species of trees or shrubs from Medit. region to Asia, 1 from Canary Isls. and 1 from Mex. and Calif.; one species is grown for the nuts used in confectionery and others have been introduced as stock on which to graft *P. vera*.—Lvs. alternate, evergreen or deciduous, odd- or even-pinnate or of 3 lfts.: fls. diœcious, without petals, small, in axillary racemes or panicles, pedicels bracted at base; staminate fls. with 5-cleft calyx and 5 very short stamens with large anthers; pistillate fls. with 3–4-cleft

calyx, 1-celled sessile ovary and short 3-cleft style: fr. a dry drupe. (*Pistacia*: derived indirectly from ancient Persian *pista*.)

**P. vera**, L. **PISTACHIO**. Spreading tree up to 30 ft. high: lvs. odd-pinnate, of 3-11 lfts. or more on young shoots; lfts. ovate, slightly tapering to the base: fls. brownish-green: drupe ovoid, oblong, pedicelled, up to 1 in. long, reddish and wrinkled. *Medit. region and Orient.*

**6. SCHINUS**, L. Fifteen or more species of resinous trees mostly from S. Amer., two of which are grown for ornament in Calif.—Lvs. alternate, odd-pinnate; lfts. sessile: fls. in axillary or terminal bracteate panicles, small, white, dioecious; calyx short, 5-parted; petals 5, imbricated; stamens 10; ovary sessile, 1-celled; styles 3: drupe globose. (*Schinus*: Greek for the mastic-tree, *Pistacia Lentiscus*, which this genus resembles in its resinous juice.)

Lfts. numerous, linear-lanceolate.....1. *S. Molle*  
Lfts. usually 7, oblong.....2. *S. terebinthifolius*

**1. S. Molle**, L. **CALIFORNIA PEPPER-TREE**. **PERUVIAN MASTIC-TREE**. Evergreen tree to 20 ft. or more, with graceful pendulous branches: lvs. 10 in. and more long, of numerous linear-lanceolate lfts.  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long and  $\frac{1}{4}$ - $\frac{3}{8}$  in. wide, often serrate: fls. in much-branched panicles: fr. rose-color,  $\frac{1}{4}$ - $\frac{3}{8}$  in. diam. (*Molle*: from *Mulli*, the Peruvian name.) *American tropics.*

**2. S. terebinthifolius**, Raddi. **CHRISTMAS-BERRY-TREE**. Differs from the above in its more rigid habit: lfts. usually 7, oblong,  $1\frac{1}{2}$ -3 in. long,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. wide, very dark green above, lighter below: fls. in denser panicles: fr. smaller, bright red. *Brazil.*

**7. RHUS**, L. **SUMAC**. Trees or shrubs with milky or resinous juice, native to temp. and subtemp. regions of both hemispheres, of about 150 species, grown for their ornamental foliage.—Lvs. alternate, usually odd-pinnate, sometimes simple or 3-foliolate, entire or serrate, without stipules: fls. small, in axillary or terminal panicles, polygamous; calyx usually 5-parted, small; petals usually 5, imbricate, spreading; stamens mostly 5; ovary sessile, 1-celled; styles 3, terminal: fr. small, dry, 1-seeded, smooth or hairy. (*Rhus*: ancient Greek name.)

Rachis of lf. winged.....1. *R. javanica*  
Rachis terete.....2. *R. hirta*

**1. R. javanica**, L. (*R. Osbeckii*, Decne. *R. semialata*, Murr.). Shrub or flat-headed tree to 25 ft.: rachis winged, pubescent; lfts. 7-13, nearly sessile, ovate to ovate-oblong, acute or short-acuminate, coarsely crenate-serrate, brownish-pubescent beneath, 2-6 in. long: fls. in large broad panicles to 12 in. long, creamy-white: fr. compressed, red, densely pubescent. *Japan, China, S. Asia.*

**2. R. hirta**, Sudw. (*R. typhina*, L.). **STAGHORN SUMAC**. Shrub or tree to 30 ft., with branchlets densely velvety-hairy: lfts. 11-31, oblong-lanceolate, pointed, serrate, glaucescent beneath, 2-5 in. long: fls. in dense terminal panicles, greenish: fr. crimson, hairy. *Que. to Ont. south to Ga., Ind., and Ia.*—Inserted here because of var. *dissecta*, Rehd. (var. *laciniata*, Hort.), with lfts. pinnately dissected, which is frequently planted.

## 91. AQUIFOLIACEÆ. HOLLY FAMILY

A family of 3 genera and about 300 species widely dispersed, the center of distribution being in Cent. and S. Amer.; several species of *Ilex* are cult. in Amer. for ornamental purposes, while other species have been used medicinally in various parts of the world.—Trees or shrubs, with alternate (or very rarely opposite), simple, often evergreen lvs.: fls. bisexual, rarely unisexual, very small, axillary or terminal, solitary or fascicled or cymose; calyx 3-6-parted, usually persistent; petals 4-5, distinct or at base connate, imbricated; stamens as many as the petals or rarely more, free or slightly adhering to the petals; ovary superior, 3- to many-celled, each cell 1-2-ovuled: fr. drupaceous with 3-18 1-seeded pyrenes.

**ILEX, L. HOLLY.** About 275 species in N. and S. Amer., trop. and temp. Asia and few in Afr., Australia and Eu.; often planted for the handsome foliage and berries, sometimes made into hedges.—Evergreen or deciduous: lvs. alternate, petioled, often shining, entire or toothed or spinose, with small caducous stipules: fls. usually dioecious, small, inconspicuous, whitish, mostly in rather few-fl. axillary cymes; calyx-lobes, petals and stamens usually 4, sometimes more; ovary superior: fr. a globose berry-like drupe with 2-8 bony 1-seeded stones. (Ilex: ancient Latin name for *Quercus Ilex*.)

- A. Foliage evergreen.
  - B. Lvs. with coarse spiny teeth, rarely entire.
    - c. Fls. in axillary clusters on branches of the previous year.
      - d. Shape of lvs. ovate or oblong-ovate..... 1. *I. Aquifolium*
      - dd. Shape of lvs. quadrangular-oblong, 3-pointed at apex..... 2. *I. cornuta*
    - cc. Fls. in 1- to few-fl. axillary solitary cymes, on this year's growth..... 3. *I. opaca*
  - BB. Lvs. serrate, crenate or entire.
    - c. Fr. red or yellow; nutlet ribbed on the back.
      - d. Margin of lvs. entire..... 4. *I. integra*
      - dd. Margin of lvs. crenate or serrate.
        - e. Fls. on this year's growth: young lvs. usually pubescent beneath..... 5. *I. Cassine*
        - ee. Fls. clustered on branches of previous year: lvs. glabrous..... 6. *I. vomitoria*
    - cc. Fr. black; nutlets smooth: pistillate fls. usually solitary, on this year's growth.
      - d. Fls. 4-merous..... 7. *I. crenata*
      - dd. Fls. 5-8-merous..... 8. *I. glabra*
- AA. Foliage deciduous: fr. red.
  - B. Fls. 6-9-merous..... 9. *I. verticillata*
  - BB. Fls. 4-5-merous..... 10. *I. serrata*

1. ***I. Aquifolium*, L. ENGLISH HOLLY.** Tree to 40 ft. or more high, with many short spreading branches, forming an oblong or pyramidal head, in cult. often shrubby; branchlets glabrous or minutely downy: lvs. evergreen, shining,  $1\frac{1}{2}$ -3 in. long, short-petioled, usually ovate or oblong-ovate, waved and with strong spiny outstanding teeth often  $\frac{1}{4}$  in. long; fls. unisexual or bisexual, dull white, short-stalked, fragrant, produced in late spring and early summer, in axillary clusters on wood of the previous year: berries globular, scarlet, shining,  $\frac{1}{4}$  in. diam., containing 2-4 nutlets. (Aquifolium: Latin *point* and *leaf*, referring to the spiny lvs.) S. and Cent. Eu., W. Asia to China.—A very variable species, the lvs. of the numerous cultivars differing greatly in size, form, and spininess, and certain vars. having lvs. blotched or margined with white or yellow; many named forms are known in cult. Var. **princeps**, Moore, has broadly ovate lvs. to  $4\frac{1}{2}$  in. long, dark green, with prominent veins below, and with strong regular spines. Var. **myrtifolia**, Waterer, has ovate-lanceolate lvs.  $1-1\frac{1}{2}$  in. long, moderately spiny, rarely entire.

2. ***I. cornuta*, Lindl.** Evergreen shrub, glabrous, to 10 ft., bushy, dense and rounded, usually wider than high: lvs. dark glossy green, quadrangular-oblong,  $1\frac{1}{2}$ -4 in. long, with 3 strong spines of nearly equal size at the dilated apex, the terminal one recurved, and with 1-2 strong spines on each side of the truncate base, but rounded and spineless at base on older plants: fls. produced in summer in axillary clusters on the branches of the previous year: fr. scarlet, clustered, larger than in the preceding. N. China.

3. ***I. opaca*, Ait. (*I. quercifolia*, Meerb.). AMERICAN HOLLY.** Evergreen tree sometimes to 50 ft., with short spreading branches forming a narrow pyramidal head, glabrous or the young shoots minutely downy: lvs. oval or elliptic-lanceolate, 2-4 in. long, pungently acuminate, with large remote spiny teeth, rarely entire, dull green above, yellowish-green beneath: fls. borne in summer on the new year's growth; staminate fls. in 3-9-fl. slender-stalked cymes; pistillate fls. usually solitary; calyx-lobes ciliate: fr. dull scarlet, globose,  $\frac{1}{4}$  in. diam. Mass. to Fla. west to Mo. and Tex.

4. ***I. integra*, Thunb. (*Othra japonica*, Thunb. *Ilex Othra*, Spreng.).** Evergreen shrub or tree to 40 ft., glabrous: lvs. dark glossy green, oval to elliptic-oblong or oblong-obovate, rarely oblanceolate, narrowed at base, at apex contracted into a short obtuse point, entire or very rarely few-toothed, indistinctly veined,  $2-3\frac{1}{2}$  in. long: fls. in axillary fascicles on branches of the previous year: fr. red, globose or ovoid,  $\frac{1}{8}$ - $\frac{1}{2}$  in. long. Feb.-Apr. Japan.

5. ***I. Cassine*, L. (*I. Dahoon*, Walt.). DAHOON.** Evergreen shrub or small tree to 30 ft.: lvs. obovate to oblong-linear, acute or obtuse, often mucronulate, entire or



shallowly serrate, usually pubescent beneath when young, 2-3 in. long: fertile cymes mostly 3-fld. and 3-fruited: fr. globose, small, dull red or rarely yellow, on the season's growth. Spring. (Cassine or Cassina is an Indian name.) N. C. to Fla. west to La.—Var. *myrtifolia*, Sarg., has lvs. linear-oblong, 1-2 in. long: fr. usually solitary.

6. *I. vomitoria*, Ait. (*I. Cassine*, Walt., not L.). CASSENA. YAUPON. Much-branched shrub, rarely small tree, to 25 ft., with spreading branches: lvs. evergreen, oval or oblong, obtuse, crenate-serrate, glabrous,  $\frac{1}{2}$ -1 in., rarely to 2 in. long: fls. in spring, clustered on branches of the previous year, the sterile cymes 3-9-fld. and peduncled, the fertile 1-3-fld. and sessile: fr. scarlet, globose, about  $\frac{1}{4}$  in. diam. Va. to Fla. west to Ark. and Tex.

7. *I. crenata*, Thunb. (*I. Fortunei*, Hort.). JAPANESE HOLLY. Much-branched evergreen shrub, rarely small tree, to 20 ft.: lvs. crowded, oval, obovate or oblong-lanceolate, crenately serrate, sharp-pointed, glabrous,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long: fls. 4-merous, the pistillate usually solitary on this year's growth: fr. black, the nutlets smooth. Late spring and early summer; fr. in autumn. Japan.—There are several vars., one with lvs. spotted yellow.

8. *I. glabra*, Gray (*Prinos glaber*, L.). INKBERRY. WINTERBERRY. Much-branched evergreen shrub to 8 ft., with erect branches: lvs. obovate to oblanceolate, obtuse, entire or with a few obtuse teeth toward the apex, glabrous, 1-2 in. long: fls. in summer, 5-8-merous, the pistillate usually solitary on this year's growth: fr. black, subglobose, about  $\frac{1}{4}$  in. diam. Mass. to Fla. west to Miss.

9. *I. verticillata*, Gray (*Prinos verticillatus*, L.). BLACK-ALDER. WINTERBERRY. Deciduous shrub to 10 ft. high, with spreading branches: lvs. obovate or oblanceolate to oval or lanceolate, acuminate or acute, serrate or doubly serrate, usually pubescent beneath, 1 $\frac{1}{2}$ -3 in. long: fls. 6-9-merous, short-stalked, produced in summer: fr. bright red, axillary, about  $\frac{1}{4}$  in. diam., maturing in autumn and remaining on the branches till midwinter, rarely eaten by birds. Canada to Fla. west to Wis. and Mo.

10. *I. serrata*, Thunb. (*I. Sieboldi*, Miq.). Slender deciduous shrub to 15 ft., similar to No. 9 but smaller in every part: lvs. elliptic or ovate, 1-2 in. long, acute or acuminate, finely serrate, pubescent beneath: fls. 4-5-merous, inconspicuous, produced in summer, in axillary clusters: fr. globose, bright red,  $\frac{1}{6}$ - $\frac{1}{2}$  in. diam., in autumn. Japan.—There is a var. with yellow frs.

## 92. CELASTRACEÆ. STAFF-TREE FAMILY

Trees and shrubs, often climbing, of about 45 genera and 400 species, widely distributed over the earth except in arctic regions.—Lvs. alternate or opposite, simple, stipules when present small and caducous: fls. usually bisexual, regular, small, in axillary or terminal cymes or racemes or solitary; calyx small, 4-5-lobed or -parted, imbricated, persistent; petals 4-5, imbricated; stamens 4-5, alternate with petals, inserted on the conspicuous disk; ovary 2-5-celled, free or imbedded in the disk, with short style and entire or 3-5-lobed stigma, ovules usually 2 in each cell, seldom 1 or many: fr. a caps., berry, drupe or samara; seeds usually with a pulpy aril.—*Pachistima Canbyi*, Gray, a dwarf evergreen shrub native in the mts. of Va., is sometimes transferred into borders; and *P. Myrsinites*, Raf., an evergreen shrub to 2 ft., native from B. C. to Calif., may be found in cult. *J*, Fig. 10, page 387.

|  |              |
|--|--------------|
| Lvs. alternate.....                      | 1. CELASTRUS |
| Plant climbing: ovary free.....          | 2. MAYTENUS  |
| Plant erect: ovary imbedded in disk..... | 3. EUONYMUS  |
| Lvs. opposite.....                       |              |

1. CELASTRUS, L. More than 30 species of shrubs, usually climbing, native in S. and E. Asia, Australia, and Amer., useful as a wall or trellis cover and with bright-colored fr. usually persistent throughout the winter.—Lvs. alternate, petioled, usually deciduous, glabrous: fls. polygamous, small, greenish-white, in axillary or terminal panicles or racemes; calyx 5-parted; petals 5, inserted under the disk; stamens 5, with short filaments; disk entire or 5-lobed; ovary free, 2-4-lobed and -celled: caps. loculicidally dehiscent by

2-4 valves, each with 1-2 seeds inclosed in a crimson aril. (Celas-trus: ancient Greek name.)

Fls. in axillary few-fl'd. cymes along the branches.....1. *C. orbiculatus*  
Fls. in terminal panicles or racemes.

Mature branchlets not verrucose or warty.....2. *C. scandens*  
Mature branchlets distinctly verrucose.....3. *C. paniculatus*

1. *C. orbiculatus*, Thunb. (*C. articulatus*, Thunb.). Vigorous, climbing to 40 ft.: lvs. suborbicular to oblong or obovate, acute or acuminate, crenate-serrate, 2-5 in. long: fls. 2-4 together in small axillary cymes along the branches: caps. globular, 3-valved, the inner surface orange-yellow, seeds crimson. Japan, China.

2. *C. scandens*, L. FALSE BITTER-SWEET. WAXWORK. Twining shrub to 25 ft., many plants often sterile: lvs. ovate to ovate-lanceolate, acuminate, crenate-serrate, 2-4 in. long: fls. in terminal many-fl'd. compound racemes 2-4 in. long, the pistillate nearly simple: caps. about  $\frac{1}{2}$  in. diam., orange-yellow, when opening disclosing the crimson covering of the seeds. Que. to Man., south to N. C. and New Mex.

3. *C. paniculatus*, Willd. Scandent and spreading shrub, the branches covered with pale lenticular warts: lvs. thicker than No. 2, ovate-oblong or obovate, 2½-5 in. long, usually very abruptly pointed, crenate-toothed: fls. of both sexes in terminal pendulous panicles 4-8 in. long: caps. 3-celled with 3-6 yellowish seeds enveloped in a scarlet aril. Himalayas.

2. **MAYTENUS**, Feuill. About 70 species of evergreen trees and shrubs, native in trop. and temp. S. Amer. and W. Indies, one planted as a street and avenue tree in warm countries.—Lvs. alternate, petioled, serrate, leathery: fls. small, polygamous, in axillary clusters or solitary; calyx 5-lobed; petals 5, spreading; stamens 5; disk orbicular, margin undulate; ovary imbedded in disk, 2-4-celled, the style slender or 0, stigma 2-4-lobed: caps. leathery, 1-3-celled, loculicidally dehiscent by 2-3 valves. (Mayte-nus: from the Chilean name.)

**M. Boaria**, Molina. MAYTEN. Graceful evergreen to 25 ft. but said to attain 100 ft. in the wild, with pendulous branchlets: lvs. lanceolate or ovate-lanceolate, acute, 1-1½ in. long: fls. minute, clustered, greenish: caps. about size of a pea, 2-valved, the seeds with scarlet aril. (Boaria: probably an aboriginal name.) Chile.

3. **EUONYMUS**, L. SPINDLE-TREE. Upright trees and shrubs or rarely creeping or climbing by rootlets, of about 120 species in the north temp. zone, grown for the attractive foliage and frs.—Branches mostly 4-angled: winter-buds usually conspicuous, with imbricate scales: lvs. opposite, petioled, entire or serrate: fls. bisexual, small, greenish or purplish, in axillary peduncled cymes; sepals and petals 4-5; stamens 4-5, the filaments very short; disk flat, 4-5-lobed; ovary imbedded in the disk, 3-5-celled, the style short or 0, the stigma 3-5-lobed: caps. 3-5-lobed, loculicidally dehiscent into 3-5 valves, the white, red, or black seeds inclosed in an orange-colored aril. (Euon-ymus: ancient Greek name.)—Sometimes spelled *Evonymus*.

Plant climbing by means of roots.....1. *E. radicans*  
Plant without rooting branches.

Branches with corky wings.....2. *E. alata*  
Branches not winged.

Margins of lvs. revolute, nearly entire.....3. *E. nana*

Margins of lvs. not revolute, serrate.

Lvs. thick, obtuse, evergreen.....4. *E. japonica*

Lvs. thin, acute or acuminate, deciduous or only half evergreen.

Antlers purple.....5. *E. Bungeana*

Antlers yellow.

Lobes of caps. winged.....6. *E. latifolia*

Lobes of caps. not winged.....7. *E. europæa*

1. *E. radicans*, Sieb. A procumbent evergreen shrub, trailing or climbing to 20 ft. high by means of roots; branches densely covered with minute warts: lvs. roundish to elliptic-oval,  $\frac{1}{2}$ -2 in. long, rounded or narrowed at base, crenately serrate, dark green above with whitish veins: fls. and fr. seldom produced except in the bush forms, the greenish 4-merous fls. in slender-peduncled clusters of 5 or

more, the caps. greenish-white or pale pink. Japan.—Var. *Carrierei*, Nichols., is a low spreading shrub. Var. *vegeta*, Rehd., is a form with bushy habit to 5 ft. high, with only a few branches procumbent and rooting, the lvs. broadly oval, fruiting profusely. Var. *minima*, Simon-Louis (*E. kewensis*, Hort.), has lvs.  $\frac{1}{4}$ – $\frac{1}{2}$  in. long. There are other forms in which the lvs. are bordered with white or pinkish.

2. *E. alata*, Regel. Deciduous spreading shrub to 8 ft. high; branches with 2-4 broad corky wings: lvs. elliptic or obovate, tapering at both ends, finely and sharply serrate, 1-2 in. long, turning bright crimson in autumn; fls. greenish-yellow, 1-3 in a cyme: caps.  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, purplish, divided to base into 4 or less ovoid lobes or pods; seeds black with orange aril. China, Japan.—There is a form in which the branches are not winged.

3. *E. nana*, Bieb. Deciduous shrub of spreading or procumbent habit, 2-3 ft. high, the young branches slender and often arching: lvs. linear or linear-oblong, 1- $1\frac{1}{2}$  in. long, obtuse or acute, the margins revolute and entire or remotely denticulate: fls. purplish, 1-3 together on slender pedicels: caps. deeply 4-lobed, pink; seeds brown with orange aril. W. Asia to China.

4. *E. japonica*, L. f. Upright densely leafy evergreen shrub to 15 ft. high, the smooth branches slightly quadrangular or striped: lvs. broadly oval, obovate to narrow-elliptic, 1-3 in. long, wedge-shaped at base, usually obtuse or rounded at apex, obtusely serrate, shining above: fls. greenish-white, 5 many together in stout-peduncled cymes: caps. globose,  $\frac{1}{2}$  in. across, pink. Japan.—A variable species, having many forms with variegated lvs.

5. *E. Bungeana*, Maxim. Deciduous shrub to 15 ft. high, with slender graceful branches: lvs. slender-petioled, ovate-elliptic or elliptic-lanceolate, 2-4 in. long, abruptly long-acuminate, with fine incurved teeth: fls. yellowish-white, in few-fl. but numerous cymes, the anthers purple: caps.  $\frac{1}{2}$  in. across, deeply 4-lobed and 4-angled, yellowish, the white or pinkish seeds with orange aril. (Named for Alex. von Bunge, botanical traveler in China in 1833.) China, Manchuria.—A half evergreen form is var. *semipersistens*, Schneid.

6. *E. latifolia*, Mill. Deciduous shrub or small tree to 20 ft.: lvs. obovate-oblong, 2-4 in. long, acuminate, finely serrate: fls. yellowish-green, 7-12 together in slender-peduncled cymes: caps. about  $\frac{3}{4}$  in. across, pendulous, rosy-red, with winged lobes. S. Eu., W. Asia.

7. *E. europæa*, L. Deciduous shrub or small tree to 20 ft., with spreading bushy head: lvs. ovate or oblong-lanceolate, 1-3 in. long, acuminate, crenately serrate: fls. yellowish-green, in 3-7-fl. slender-peduncled cymes: caps. deeply 4-lobed,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, pink. Eu.—There are several vars. with variegated lvs. and with whitish or purple frs., also a dwarf form.

### 93. STAPHYLEACEÆ. BLADDER-NUT FAMILY

Trees and shrubs, of about 5 genera and 22 species of wide distribution, only one genus being grown for ornament.—Lvs. opposite or alternate, pinnately compound, stipulate: fls. bisexual, regular, in terminal or axillary clusters; sepals and petals 5, imbricated; stamens 5, alternate with petals, inserted outside the large cup-shaped disk; ovary usually 3-celled with distinct or connate styles: fr. a leathery or fleshy caps., sometimes indehiscent; seeds solitary or few in each cell.

**STAPHYLEA**, L. **BLADDER-NUT**. About 11 species of deciduous shrubs or small trees, native in temp. regions of the northern hemisphere.—Bark smooth, striped: lvs. opposite, 3-7-foliolate, the lfts. serrate and stipulate: fls. white, in drooping terminal panicles; ovary 2-3-parted to base, the 2-3 styles free or connate above: caps. 2-3-lobed, inflated, membranaceous, dehiscent at summit along the inner side, the cells containing 1-4 large bony seeds. (Staphyle-a: Greek *cluster*, referring to the infl.)—Besides the following, the native *S. trifolia*, L., may be cult.; it has 3-foliolate lvs. slightly pubescent beneath, the end lft. slender-stalked, and much inflated caps.  $1\frac{1}{2}$ –3 in. long.

- |   |                       |
|---|-----------------------|
| Fr. 3-4 in. long: sepals spreading.....           | 1. <i>S. colchica</i> |
| Fr. 1- $1\frac{1}{2}$ in. long: sepals erect..... | 2. <i>S. Bumalda</i>  |
| Lvs. 3-foliolate.....                             | 3. <i>S. pinnata</i>  |
| Lvs. 5-7-foliolate.....                           |                       |

1. *S. colchica*, Stev. Upright shrub to 12 ft. high: lvs. usually 5-foliolate, sometimes 3, the lfts. oblong-ovate, 2–3½ in. long, acuminate, sharply serrate, glabrous and lustrous green beneath, the terminal lft. long-petioled, the lateral ones nearly sessile: fls. ½–¾ in. long, in an upright or nodding panicle which is almost as broad as long; sepals yellowish-white, narrow-oblong, spreading; petals erect: caps. obovate, much inflated, 3–4 in. long, the styles persistent. Caucasus.

2. *S. Bumalda*, DC. Shrub to 6 ft. high, with upright and spreading slender branches: lvs. 3-foliolate, the lfts. broadly oval to ovate, ½–3 in. long, shortly acuminate, serrate with awned teeth, the middle lft. with petiole ½ in. or less long: fls. about ½ in. long; sepals yellowish-white, erect, little shorter than petals: caps. 2-lobed, compressed, ¾–1 in. long, the styles persistent. (Bumalda: name brought over from genus Bumalda which was named for Ovid Montalban, known as J. A. Bumalda, Italian botanical writer in 1657.) Japan.

3. *S. pinnata*, L. Shrub to 15 ft. high: lvs. 5–7-foliolate, the lfts. ovate-oblong, 2–4 in. long, acuminate, sharply and finely serrate, dull green above, pale and glaucous beneath: fls. about ½ in. long, in a raceme-like pendulous panicle; sepals oval, erect, greenish at base, reddish at apex: caps. subglobose, 1–1½ in. long. Eu. to W. Asia.

#### 94. ACERACEÆ. MAPLE FAMILY

Trees or shrubs with watery sap often saccharine, native in mountainous or upland countries of the northern hemisphere, of only 2 genera and more than 100 species.—Lvs. opposite, petioled, exstipulate, simple or compound: fls. in axillary or terminal cymes or racemes, regular, polygamous or dioecious; sepals 4–5; petals 4–5, rarely 0; disk fleshy, annular, more or less lobed, rarely lacking; stamens 4–10, usually 8, inserted on summit or inside of disk, hypogynous, filaments filiform; ovary superior, 2-lobed, 2-celled with 1–2 ovules in each cell, much flattened contrary to the partition; styles 2, inserted between lobes of ovary, connate below: fr. splitting into 2 parts, each a samara. *K*, *L*, Fig. 10, page 387.

ACER, L. MAPLE. Over 100 species in N. Amer., Cent. and E. Asia, Eu., N. Afr., many of which are grown as shade trees and for their ornamental foliage. Technical characters as for the family; nutlets with elongated wing on one side. (A-cer: classical Latin name.)—*A. rubrum*, L., a precocious-flowering native species, has yielded several vars. which are occasionally found in cult. *A. macrophyllum*, Pursh, with very large lvs., is often transplanted in W. N. Amer., where it is native.

- |   |                              |
|---|------------------------------|
| A. Lvs. 3–5-foliolate.....  | 1. <i>A. Negundo</i>         |
| AA. Lvs. simple.  |                              |
| B. Under surface of lvs. gray or white.                                   |                              |
| c. Fls. appearing long before lvs.....                                    | 2. <i>A. saccharinum</i>     |
| CC. Fls. appearing with or after lvs.                                     |                              |
| d. Sepals united, petals wanting.....                                     | 3. <i>A. saccharum</i>       |
| DD. Sepals and petals distinct.....                                       | 4. <i>A. Pseudo-platanus</i> |
| BB. Under surface of lvs. green.  |                              |
| c. Wings of frs. practically parallel.                                    |                              |
| d. Lvs. not lobed.....  | 5. <i>A. tataricum</i>       |
| DD. Lvs. 3-lobed.....   | 6. <i>A. Ginnala</i>         |
| CC. Wings of frs. horizontally spreading, not parallel.                   |                              |
| d. Lvs. not lobed beyond middle.  |                              |
| E. Lobes of lvs. obtuse.....  | 7. <i>A. campestre</i>       |
| EE. Lobes of lvs. acute.  |                              |
| F. Margin of lobes entire.....  | 8. <i>A. pictum</i>          |
| FF. Margin of lobes toothed.  |                              |
| g. Number of lobes 5.....   | 9. <i>A. platanoides</i>     |
| GG. Number of lobes 7–11.   |                              |
| h. Branchlets, pedicels and peduncles pubescent, at least when young..... | 10. <i>A. japonicum</i>      |
| HH. Branchlets, pedicels and peduncles glabrous.....                      | 11. <i>A. circinatum</i>     |
| DD. Lvs. lobed beyond middle.....   | 12. <i>A. palmatum</i>       |

1. *A. Negundo*, L. (*Negundo fraxinifolium*, Nutt. *N. aceroides*, Moench). BOX-ELDER. Large tree to 70 ft.: lvs. pinnate; lfts. 3–5, ovate or oblong-lanceolate, coarsely serrate or 3-lobed, 2–5 in. long: fls. appearing before lvs., in pendulous



racemes or panicles, diœcious: frs. in racemes 6-8 in. long; nutlets diverging at acute angle. (Negundo: name used by John Ray, 1688, without explanation.) E. N. Amer., to Fla., and Tex.—Runs into races with curled lfts., lvs. spotted or margined yellow, lvs. with broad white margins, or branches purplish with glaucous bloom. Var. *californicum*, Sarg., has 3 lfts. densely pubescent beneath. W. N. Amer.

2. *A. saccharinum*, L. (*A. dasycarpum*, Ehrh.). WHITE or SILVER MAPLE. Large tree to 120 ft.: lvs. 3-6 in. long, very long-petioled, deeply 5-lobed, lobes acuminate, remotely dentate, green above, silvery-white beneath: fls. appearing long before lvs., greenish-yellow, in nearly sessile lateral corymbs, apetalous: fr. on slender drooping pedicels, pubescent when young, with large divergent wings. E. N. Amer. to Fla., west to Neb.—Var. *Wieri*, Schwerin, has pendulous branches and deeply cleft lvs. with dissected lobes. Varies into many lf.-forms, as lvs. deeply cut and crimped, spotted with white or pink, yellow, 3-parted.

3. *A. saccharum*, Marsh. (*A. saccharinum*, Wang., not L.). SUGAR or ROCK MAPLE. Large tree to 120 ft.: lvs. 3-6 in. long, cordate at base, 3 5-lobed, green above, pale beneath, lobes acuminate, the sinuses rounded: fls. appearing with lvs., in almost sessile lateral or terminal corymbs, on long hairy pedicels, greenish-yellow, apetalous: fr. glabrous with slightly diverging wings. E. N. Amer., south to Fla. and Tex., west to central states.—An upright columnar form is also grown. Much of the *A. saccharum* in the trade is *A. nigrum*, Michx., which differs in having black bark and the lvs. green and pubescent beneath.

4. *A. Pseudo-platanus*, L. SYCAMORE MAPLE. To 70 ft. high: lvs. 5-lobed, lobes acute, coarsely crenate-serrate, 4-8 in. across, dark green above, pale and glaucous beneath, usually glabrous: fls. in pendulous racemes; stamens hairy, exserted: fr. glabrous, with widely diverging wings. Eu., W. Asia.—Runs into many vars. such as lvs. pubescent beneath, purplish or purplish-red beneath, lvs. yellow or with white or yellow spots or blotches, and one with bright red fr.

5. *A. tataricum*, L. Shrub or small round-headed tree to 20 ft.: lvs. 2-4 in. long, usually not lobed, roundish-oval or oblong, cordate at base, doubly serrate: fls. white, in long-peduncled panicles: fr. with nearly parallel wings, becoming bright red. S. E. Eu., Orient.

6. *A. Ginnala*, Maxim. (*A. tataricum* var. *Ginnala*, Maxim.). Graceful shrub or small tree to 20 ft.: lvs. 1-4 in. long, 3-lobed, the terminal lobe elongated, doubly serrate, glabrous: fls. yellowish, in long-peduncled panicles: fr. with nearly parallel wings. (Ginnala: a vernacular name where the plant is native.) Manchuria, N. China, Japan.

7. *A. campestre*, L. Shrub or round-headed tree, seldom exceeding 20 ft., with corky fissured bark: lvs. 1-4 in. long, divided to about the middle into 3-5 obtuse lobes, entire or middle lobe slightly 3-lobed, glabrous above, often pubescent beneath: fls. in loose erect corymbs: fr. pubescent, wings spreading horizontally forming a straight line. Eu., W. Asia.—Forms with lvs. blotched or sprinkled with white are sometimes seen.

8. *A. pictum*, Thunb. To 60 ft. high: lvs. with 5-7 entire acuminate lobes, sometimes very broad and short, 3-7 in. across: fls. yellow, in erect corymbs: wings of fr. horizontally spreading, hardly twice as long as nutlets. Manchuria, Japan.

9. *A. platanoides*, L. NORWAY MAPLE. Large tree with round spreading head, to 100 ft.: lvs. 3-5 in. long and broad, 5-lobed, cordate at base, remotely sharp dentate, lobes acute, light green and lustrous beneath: fls. yellowish-green, in erect glabrous corymbs: fr. glabrous, with horizontally spreading wings. Eu., W. Asia.—Var. *Schwedleri*, Koch, has bright red lvs. when young, changing to dark green. There are many garden forms remarkable for the coloring of the lvs. or the habit and the way in which the lvs. are cut.

10. *A. japonicum*, Thunb. Small tree or shrub: branchlets, petioles and peduncles pubescent, at least when young: lvs. 2-5 in. long and broad, 7-11-lobed, not lobed to middle, cordate at base, lobes acuminate, doubly serrate: fls. large, purple, in pendulous corymbs: fr. finally glabrous, with widely diverging wings. Japan.—A var. with lvs. divided nearly to the base is known; also a yellow-leaved form and one with large bright green lvs.

11. *A. circinatum*, Pursh. Small tree, rarely to 40 ft.: branchlets, petioles and peduncles glabrous: lvs. almost circular in outline, 2-7 in. across, 7-9-lobed, lobes acute, doubly serrate: fls. large, with purple sepals, in pendulous corymbs: fr. with wings spreading almost at right angles, red, in early summer. W. N. Amer.

12. *A. palmatum*, Thunb. (*A. polymorphum*, Sieb. & Zucc.). JAPAN MAPLE. Shrub or small tree to 20 ft.: branchlets, petioles and peduncles glabrous: lvs. 2-4 in. across, 5-9-lobed beyond middle or divided, lobes acuminate, doubly serrate or incised: fls. small, purple, in glabrous erect corymbs: fr. less than 1 in. long, with widely spreading wings. Japan.—Numerous vars. are in cult., with lvs. variously dissected and colored.

## 95. HIPPOCASTANACEÆ. HORSE-CHESTNUT FAMILY

Trees or shrubs of 2 genera and over 20 species widely distributed in the north temp. zone.—Lvs. opposite, exstipulate, digitately 3-9-foliolate: fls. polygamous, irregular, in terminal panicles; calyx tubular or campanulate, usually 5-lobed; petals 4-5, clawed, unequal; stamens 5-8, inserted on disk, free, with filiform filaments; ovary superior, sessile, 3-celled, ovules 2 in each cell; style slender: fr. a leathery caps., smooth or spiny, 3-celled or by abortion 1-celled; seeds large, shining.

**ÆSCULUS**, L. HORSE-CHESTNUT. BUCKEYE. About 16 species, some of which are grown for shade trees or for the conspicuous fls.—Technical characters as for the family: lvs. 5-9-foliolate. (*Æsculus*: classical name of an oak tree.)—Aside from the species described, the following from the southern states are sometimes cult.: *Æ. parviflora*, Walt., a shrub 3-10 ft. high, with 5-7-foliolate lvs. and white fls. with stamens more than twice as long as petals; *Æ. Pavia*, L., Red Buckeye, a shrub or small tree 4-20 ft. high, with 5-7-foliolate lvs. and dark red or purplish fls. with tubular calyx; *Æ. octandra*, Marsh. (*Æ. flava*, Ait.), Sweet Buckeye, a tree reaching to 90 ft., with 5-foliolate lvs. and yellow fls. with campanulate calyx. *Æ. californica*, Nutt., a tree to 40 ft. high, with 5-7 petioled lfts. and white or pale rose-colored fls., is sometimes transferred in Calif.

Mature lfts. glabrous beneath or with only few tufts of hairs in axils of veins, sessile.

Corolla spreading; calyx  $\frac{1}{4}$  in. or less long. .... 1. *Æ. Hippocastanum*

Corolla not spreading; calyx  $\frac{3}{8}$  in. or more long. .... 2. *Æ. carnea*

Mature lfts. pubescent beneath, short-petioled. .... 3. *Æ. hybrida*

1. *Æ. Hippocastanum*, L. COMMON HORSE-CHESTNUT. A large tree to 100 ft. high, with very resinous buds: lvs. 5-7-foliolate, long-petioled; lfts. sessile, 3-8 in. long, cuneate-obovate, obtusely serrate: panicles very showy, up to 12 in. long; calyx  $\frac{1}{4}$  in. or less long, caescent; petals 5, spreading, white blotched with red and yellow: fr. globose, prickly. Greece to Caucasus.—There are many cultivars, such as those with lacinate and incisely lobed lfts., round and pyramidal heads, dwarf habit, double fls., and lvs. variegated with yellow.

2. *Æ. carnea*, Hayne (*Æ. Hippocastanum*  $\times$  *Æ. Pavia*. *Æ. rubicunda*, Loisel.). Tree to 40 ft. high, with resinous winter-buds: lvs. usually 5-foliolate, long-petioled; lfts. almost sessile, cuneate-obovate, crenate-serrate: panicles to 8 in. long; calyx  $\frac{3}{8}$  in. or more long, caescent; corolla erect from calyx, not spreading, varying from flesh-color to scarlet: fr. with small prickles.—Varies into many garden forms according to shade in coloring.

3. *Æ. hybrida*, DC. (*Æ. octandra*  $\times$  *Æ. Pavia*). Winter-buds not resinous: lvs. 5-foliolate, long-petioled; lfts. pubescent beneath, short-petioled, minutely crenulate-serrate: calyx narrow-campanulate, red or yellowish-red; petals erect, not spreading, villous and glandular on margins, yellowish or reddish. Garden origin.

## 96. SAPINDACEÆ. SOAPBERRY FAMILY

About 125 genera and more than 1,000 species of trees and shrubs or rarely herbs, often climbing, of wide distribution in the tropics and warm regions.—Lvs. usually alternate, mostly pinnately or palmately compound, sometimes simple: fls. unisexual or polygamous, borne in racemes, panicles or corymbs, regular or irregular; calyx of 4-5 imbricated or valvate sepals; petals 4-5 or wanting, often with hairs or scales at the base inside; disk well developed,

situated between petals and stamens; stamens usually 5-10, the filaments distinct or united at base; ovary superior, 2-4-celled (sometimes more), with 1 or more ovules in each cell, the style simple or divided: fr. very diverse.

- A. Plant an erect tree or shrub.
  - B. Fr. indehiscent, berry-like or drupe-like.
    - c. Diam. of fr.  $\frac{1}{2}$ - $\frac{3}{4}$  in., inedible..... 1. *SAPINDUS*
    - cc. Diam. of fr. about 1 in. or more, edible.
      - d. Surface of fr. smooth..... 2. *MELICOCOA*
      - dd. Surface of fr. tuberculate.
        - e. Petals 0; fr. red..... 3. *LITCHI*
        - ee. Petals present; fr. yellow-brown..... 4. *EUPHORIA*
  - BB. Fr. dehiscent, capsular.
    - c. Petals 0; disk wanting or very small..... 5. *DODONÆA*
    - cc. Petals and disk present.
      - d. Caps. bladdery: fls. irregular..... 6. *KÆLREUTERIA*
      - dd. Caps. with thick hard walls: fls. regular.
        - e. Disk produced into 5 horns..... 7. *XANTHOCERAS*
        - ee. Disk annular.
          - f. Calyx deeply 5-parted; stamens long-exserted..... 8. *BLIGHIA*
          - ff. Calyx of 5 separate sepals; stamens short..... 9. *CUPANIA*
  - AA. Plant a vine.
    - B. Caps. inflated, membranaceous, loculicidal..... 10. *CARDIOSPERMUM*
    - BB. Caps. pear-shaped, septicidal..... 11. *PAULLINIA*

1. *SAPINDUS*, L. SOAPBERRY. Trees and shrubs native in the tropics, of about 15 species, occasionally planted for ornament and sometimes grown for their frs. which are rich in saponin.—Lvs. usually pinnately compound, exstipulate, the lfts. entire or serrate: fls. very small, regular, polygamous, in axillary or terminal panicles or racemes; sepals 4-5, in 2 rows; petals 4-5, inserted under the annular fleshy disk, naked or bearing a scale at summit of claw; stamens 8-10, inserted on disk, the filaments distinct; ovary 2-4-celled, with 1 ovule in each cell, the stigma 2-4-lobed: fr. a fleshy or leathery berry, the bony seeds black or nearly so, without aril. (Sapin-dus: Latin *soap* and *Indian*, from the soapy qualities of the berries.)

*S. Saponaria*, L. Small tree to 30 ft. high, with rough grayish bark: lvs. evergreen, 6-7 in. long, with rachis usually broadly winged, but sometimes unwinged: lfts. usually 7-9, elliptic to oblong-lanceolate, obtuse or acute, entire or somewhat undulate, bright green and lustrous above, paler and tomentulose beneath: fls. in terminal panicles 7-10 in. long; sepals ciliate on margins; petals ovate, white, without scales, ciliate; filaments hairy: berry globose,  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam., shining, with orange-brown translucent flesh, ripening in spring or early summer. S. Fla., W. Indies, S. Amer.

2. *MELICOCOA*, L. Two species of trees native in trop. Amer., one of which is grown in warm regions for its edible fr.—Lvs. abruptly pinnate, with 2-3 pairs of nearly sessile lfts., exstipulate: fls. small, regular, polygamous or dioecious, in elongated simple or branched racemes; calyx deeply 4-5-lobed; petals 4-5; disk flattened, 4-5-lobed; stamens 8, the filiform filaments distinct; ovary 2-3-celled with 1 or 2 ovules in each cell, the style short and stigma 2-3-lobed: fr. a drupe with fleshy pulp. (Melicoc-ca: Greek *honey berry*, referring to taste of fr. Sometimes written *Melicoccus*.)

*M. bijuga*, L. SPANISH-LIME. GENIP. MAMONCILLO. Slow-growing tree sometimes attaining 60 ft.: lvs. with rachis winged or wingless, with 2 pairs of elliptic or elliptic-lanceolate acute glabrous lfts.: racemes many-fl'd., to 4 in. long, in terminal panicles; fls. greenish-white, fragrant: drupe smooth, globose, green, about 1 in. or more in diam., the large round seed (which is sometimes roasted like a chestnut) surrounded by yellowish translucent juicy pulp. W. Indies, Cent. and S. Amer.

3. *LITCHI*, Sonn. One Chinese species, widely cult. in the tropics for its fr. which is eaten either fresh or dried, in the latter form known as "litchi nuts."—Lvs. abruptly pinnate, with 2-4 pairs of coriaceous elliptic-oblong to lanceolate sharply acute lfts., glabrous and shining above, glaucescent beneath:

fls. regular, polygamous, small, greenish-white or yellowish, in terminal panicles sometimes 1 ft. long; sepals small, valvate; petals wanting; disk fleshy; stamens usually 8, with hairy filaments; ovary on a short stalk, 2-3-lobed and -celled with 1 ovule in each cell, pubescent, the stigma 2-lobed: fr. a drupe, covered with angular prominent tubercles. (Lit-chi: Chinese name.)

*L. chinensis*, Sonn. (*Nephelium Litchi*, Cambess. *Dimocarpus Litchi*, Lour.). LITCHI. LEECHEE. LYCHEE. A round-topped tree 30-40 ft. high: fr. 1-1½ in. diam., bright red when ripe, the outer covering hard, brittle and rough, the flesh white, translucent and juicy, separating readily from the small seed.

4. **EUPHORIA**, Comm. Six or more species of trees native in trop. and subtrop. Asia, one of which is grown in warm regions for its edible fr.—Very similar to Litchi but distinguished by its imbricate sepals, the presence of petals, and the fr. covered with flattened sometimes indistinct tubercles. (Eupho-ria: Greek *carries well*, alluding to the attractive frs.)

*E. Longana*, Lam. (*Nephelium Longana*, Cambess. *Dimocarpus Longan*, Lour.). LONGAN. LUNGAN (vernacular names). Tree 30-40 ft. high: lvs. of 2-5 pairs of elliptic to lanceolate rather obtuse lfts. with somewhat prominent veins, glabrous and glossy: fls. small, yellowish-white, in axillary or terminal panicles: fr. globose, 1 in. or sometimes less in diam., yellow-brown, the outer covering thin and shell-like, with white juicy pulp surrounding the dark brown shining seed. India.

5. **DODONÆA**, L. About 50 species of trees and shrubs native mostly in Australia, but a few in Afr., Hawaii, and trop. Amer., occasionally grown for ornament far S.—Lvs. alternate, simple or pinnate, exstipulate: fls. regular, small, polygamous and often dioecious, axillary or terminal, solitary or in racemes or panicles; sepals 3-7, imbricated or valvate; petals wanting; disk wanting or very small; stamens usually 8 with short distinct filaments, rarely more or fewer; ovary 3-6-celled with 2 ovules in each cell, with lobed stigma: fr. a membranaceous or leathery 2-6-angled caps., septicidally dehiscent by 2-6 valves which are usually winged on the back. (Dodonæ-a: after Rembert Dodoens, 1518-1585, Dutch physician and author.)

Lvs. simple and entire.

Length of lvs. 1 in. or less..... 1. *D. cuneata*

Length of lvs. 1½-4 in.

Shape of lvs. obovate-oblong, ¾-1 in. wide..... 2. *D. viscosa*

Shape of lvs. lanceolate, ¼-½ in. wide..... 3. *D. Thunbergiana*

Lvs. pinnate..... 4. *D. madagascariensis*

1. *D. cuneata*, Rudge. A much-branched usually viscid shrub: lvs. obovate or cuneate, ½-1 in. long, rather broad, rounded, truncate or toothed at end, short-petioled: fls. in short terminal scarcely branched racemes, or sometimes few in axillary clusters: caps. with rather rigid usually not very broad wings, the terminal sinus open. Australia.

2. *D. viscosa*, L. A more or less viscid shrub to 15 ft.: lvs. obovate-oblong; 3-4 in. long and ¾-1 in. wide, short-petioled, entire: fls. in short terminal or axillary racemes: caps. nearly ¾ in. long, with 3 broad membranaceous wings, cordate at base and notched at apex. Widely distributed in warm countries.—There seems to be confusion as to the limitation of this species, or it is exceedingly variable.

3. *D. Thunbergiana*, Eckl. & Zeyh. Glabrous much-branched shrub to 10 ft. high: lvs. lanceolate or linear-lanceolate, 1½-2½ in. long and ¼-½ in. wide, narrowed at base, somewhat viscid: fls. in dense simple or branched racemes: caps. about ½ in. long, resinous and shining, 2-3-winged. (Carl Peter Thunberg, page 699.) S. Afr.

4. *D. madagascariensis*, Radlk. Tree to 14 ft. high: lvs. odd-pinnate, with about 12 pairs of linear-lanceolate acuminate lfts. 1-1½ in. long and ½ in. or less wide, puberulent, the margins entire or subrevolute: fls. dioecious, with pubescent bracts and pedicels; sepals 6-7, linear-subulate; stamens usually 12: caps. obcordate, 3-winged and 3-celled. Madagascar.



6. **KÆLREUTERIA**, Laxm. Chinese and Japanese deciduous trees of 5 species, one planted for ornament.—Lvs. alternate, exstipulate, odd-pinnate, the lfts. serrate: fls. yellow, irregular, polygamous, in large terminal panicles; calyx deeply divided into 5 unequal lobes; petals 4, lanceolate, turned upward, clawed, with 2 upturned appendages at base of blade; disk crenate at upper margins; stamens 8 or less, with long distinct filaments; ovary 3-celled with 2 ovules in each cell, the style 3-cleft: fr. a bladdery caps., loculicidally dehiscent by 3 valves, the seeds roundish and black. (Kœlreuteria: after Joseph G. Kœlreuter, 1734–1806, professor of natural history at Karlsruhe.)

**K. paniculata**, Laxm. Round-headed tree to 30 ft.: lvs. to 14 in. long, the 7–15 lfts. ovate to oblong-ovate, coarsely and irregularly crenate-serrate or at base often incisely lobed, dark green and glabrous above, paler and usually pubescent on veins beneath: fls. pedicelled, about  $\frac{1}{2}$  in. long, in many-fl. broad panicles to 18 in. long, in July and Aug.: caps.  $1\frac{1}{2}$ –2 in. long, with papery walls, the ovate-oblong valves gradually narrowed into pointed apex. China, Korea, Japan.

7. **XANTHOCERAS**, Bunge. One species from N. China, a deciduous shrub planted for its attractive fls.—Lvs. alternate, odd-pinnate, the lfts. serrate, exstipulate: fls. regular, polygamous, in terminal or axillary racemes, appearing before or with the first lvs.; sepals 5; petals 5, about three times longer than sepals; disk produced into 5 suberect cylindric horns about half as long as stamens; stamens 8, with elongated distinct filaments; ovary 3-celled, with 7–8 ovules in each cell, stigma 3-lobed: fr. a hard thick-walled caps., loculicidally dehiscent by 3 valves. (Xanthoceras: Greek for *yellow* and *horn*, referring to the horn-like processes of the disk.)

**X. sorbifolia**, Bunge. Glabrous shrub or small tree to 15 ft. high: lvs. 6–12 in. long, the 9–17 sessile lfts. narrow elliptic to lanceolate, sharply serrate, dark green above, paler beneath: fls. white, slender-pedicelled, about  $\frac{3}{4}$  in. across, each petal above with blotch at base changing from yellow to red, blooming in May: fr. green,  $1-2\frac{1}{2}$  in. long, with large dark brown seeds.

8. **BLIGHIA**, Kœnig. One tree, native in Guinea, grown in the tropics for its edible fr.—Lvs. abruptly pinnate: fls. regular, polygamous, borne in axillary racemes; calyx small, deeply 5-parted, valvate or slightly imbricated; petals 5, longer than the calyx, bearing scales on the inner side; disk annular, hairy; stamens 8–10, long-exserted in staminate fls., the filaments filiform; ovary short-stalked, 3-celled with 1 ovule in each cell, the stigma 3-toothed: fr. a caps., with thick hard walls, dehiscent from apex to base by 3 valves. (Blighia: after W. Bligh, British mariner, commander of the "Bounty," who wrote on a journey in the South Seas, 1792.)

**B. sapida**, Kœnig (*Cupania sapida*, Voigt). AKEE. Stiff-branched tree to 40 ft. high: lfts. 3–5 pairs, short-petioled, obovate-oblong, the upper ones 4–6 in. long, the lower ones much shorter: fls. small, greenish-white: caps. about 3 in. long, roundish or triangular in general outline, straw-colored to magenta-red, each cell containing 1 round shining seed with a white fleshy aril at its base.

9. **CUPANIA**, L. More than 30 species of trees and shrubs in trop. and subtrop. Amer., sometimes planted for ornament in warm regions.—Closely allied to Blighia, but differing in its calyx of 5 separate broadly imbricated sepals, the petals sometimes bearing scales, the filaments of the stamens usually short. (Cupania: after Francis Cupani, 1657–1710, Italian monk and author of botanical works.)

**C. anacardioides**, A. Rich. Slender almost glabrous tree to 40 ft. high: lfts. 3–5 pairs, short-petioled, coriaceous, broadly ovate to elliptic-oblong, very obtuse, to 4 in. long, entire: fls. white, in loose panicles; petals with 2 short scales at base: caps. leathery, about  $\frac{3}{4}$  in. across, nearly sessile, slightly 3-lobed. Australia.

10. **CARDIOSPERMUM**, L. About 15 species of herbaceous vines, widely distributed in warm and temp. regions.—Extensively branching, the branches grooved: lvs. alternate, biternate, the lfts. coarsely serrate, exstipulate: fls. slightly irregular, polygamous or dioecious, in axillary tendril-bearing corymbs; sepals 4, the 2 outer ones smaller; petals 4, unequal; disk one-sided, undulate; stamens 8, the unequal filaments distinct or united at base; ovary 3-celled with 1 ovule in each cell, the short style 3-cleft: fr. a membranaceous inflated veiny caps., loculicidally dehiscent by 3 valves. (Cardiospermum: Greek for heart and seed, from the white heart-shaped spot on the black seed.)

St. glabrous.....1. *C. Halicacabum*  
St. densely hairy.....2. *C. hirsutum*

1. **C. Halicacabum**, L. BALLOON-VINE. HEART-SEED. Perennial but treated as an annual, climbing to 10 ft.: lvs. 2–4 in. long, the lfts. ovate or oblong, acute or acuminate: peduncles usually longer than lvs., bearing few-fl. corymbs; fls. white: caps. much inflated, 3-angled, about 1 in. across and somewhat longer, the black seeds about the size of a pea. (Halicacabum: pre-Linnaean substantive name, referring to the bladdery frs.) Trop. and subtrop. regions around the world; naturalized N. J. south.

2. **C. hirsutum**, Willd. Perennial creeping or ascending vine, the st. densely hairy: lvs. usually pubescent below: fls. white: caps. much inflated, pointed, pubescent, 1½–2 in. long, much longer than broad. Afr.

11. **PAULLINIA**, L. Twining shrubs native in trop. Amer. and Afr., of about 140 species, one grown in greenhouses and as a pot plant.—Closely allied to Cardiospermum but differing in the stipulate lvs. which are 1–3-ternate or pinnate or decomposed, the petioles often winged, and the pyriform somewhat fleshy capsular fr. which is septicidally dehiscent by 3 valves, the valves often winged. (Paullinia: after a Danish botanist Paulli, probably Simon Paulli, 1608–1680.)

**P. thalictrifolia**, Juss. Branches pubescent: lvs. 4–10 in. long, 3-ternately-pinnate, the young lvs. of attractive bronze tint when not too much shaded: fls. very small, pale pink: caps. nearly 1 in. long, tawny, densely pubescent but becoming glabrescent outside, 3-winged. Brazil.

## 97. MELIANTHACEÆ. MELIANTHUS FAMILY

African trees or shrubs, of 3 genera and about 20 species, grown for ornament in warm regions.—Lvs. alternate, entire or pinnate, the rachis often winged: fls. bisexual, inverted by the twisting of the pedicels, borne in racemes, irregular or regular; sepals 5 or 4, imbricate; petals 4 or 5; disk between petals and stamens crescent-shaped or annular with 10 projections; stamens 4, 5, or 10, the filaments distinct or connate at base; ovary superior, 4–5-celled with 1 or many ovules in each cell, the stigma 4–5-lobed: fr. a caps.

Lvs. pinnate: stamens 4.....1. **MELIANTHUS**  
Lvs. simple: stamens 10.....2. **GREYIA**

1. **MELIANTHUS**, L. A half-dozen S. African strong-scented shrubs.—Lvs. odd-pinnate, stipulate, the lfts. unequal-sided: fls. in axillary or terminal racemes, very irregular; calyx laterally compressed, the 5 sepals united at base, unequal, often gibbous at base; petals 5, but the anterior one abortive, long-clawed; disk with nectar-bearing glands; stamens 4, didynamous; ovary 4-lobed and 4-celled with 2 or more ovules in each cell: caps. inflated, papery or woody, loculicidally dehiscent by 4 valves, usually with only 1 seed in each cell. (Melianthus: Greek honey flower.)

Stipules connate into 1, 2 in. or more long; lfts. glabrous beneath.....1. *M. major*  
Stipules 2, free, ½ in. long; lfts. white-tomentose beneath.....2. *M. comosus*

1. **M. major**, L. Glabrous shrub to 10 ft. or more high, with widely creeping root: lvs. 1 ft. or more long, dull green above, paler beneath; stipules connate into

1 intra-axillary piece, attached to lower part of petiole, 2 in. or more long; lfts. 9-11, deeply serrate, to 6 in. long, petiole with cuneate wings between lfts.: racemes densely fld., 1 ft. or more long; bracts ovate, acuminate; fls. red-brown, 1 in. long: caps. papery, 1-1¼ in. long, glabrous.

2. *M. comosus*, Vahl. Shrub with canescent or villous branches: lvs. 4-6 in. long; stipules 2, free, ½ in. long; lfts. lanceolate, serrate, pubescent with stellate hairs above but becoming glabrate, white-tomentose beneath, petiole winged between lfts.: racemes nodding, about 3 in. long, frequent between lvs. on branches; bracts cordate-acuminate; fls. alternate, orange inside, red-spotted outside and green at base: caps. 1 in. long, soft pubescent.—Apparently sometimes grown as *M. minor*, L., which differs in the erect racemes with the fls. in whorls and lanceolate attenuate bracts.

2. *GREYIA*, Hook. & Harv. Three species of small trees from S. Afr.—Lvs. simple, long-petioled, exstipulate: fls. showy, in dense many-fld. axillary racemes, regular; sepals 5, free, persistent; petals 5, perigynous, deciduous; stamens 10, inserted inside the disk and alternating with its 10 gland-bearing projections, with long slender filaments; ovary deeply 5-grooved, 5-celled, many-ovuled, with long style and small stigma: caps. membranaceous or leathery, septicidally dehiscent by 5 valves. (Grey-ia: after Sir George Grey, once governor of Cape Colony.)

*G. Sutherlandii*, Hook. & Harv. Small tree with light-colored bark: lvs. clustered at ends of branches, orbicular to oblong, 2-3 in. long, deeply cordate at base, irregularly toothed: fls. bright scarlet, 1½ in. long, in dense racemes to 10 in. long, the stamens and style long-exserted: caps. membranaceous, 5-lobed, the seeds minute. (Named for Dr. Sutherland.)

## 98. BALSAMINACEÆ. BALSAM FAMILY

Two genera and more than 500 species of soft or succulent herbs, of wide distribution around the world.—Lvs. simple, alternate, opposite or whorled, exstipulate, petioled: fls. bisexual, very irregular, solitary in the axils or somewhat clustered; sepals 3, rarely 5, the 2 lateral small and green, the posterior one large, petaloid, saccate, and gradually prolonged backward into a honey-spur; petals 5, or 3 by the union of 2 pair, unequal; stamens 5, alternate with petals, with short flat filaments and anthers coherent or connivent; ovary 5-celled with 3 to many ovules in each cell, with short style and 5-lobed stigma: fr. a caps. or berry. *M*, Fig. 10, page 387.

*IMPATIENS*, L. Probably 500 species, mostly in mountainous regions in warm temp. and trop. countries, one the balsam of flower-gardens and a few other species grown in the greenhouse.—Technical characters as above: fr. an oblong or linear caps., elastically dehiscent into 5 coiled valves, expelling the seeds. (Impa-tiens: from Latin, referring to the sudden bursting of the ripe pods when touched.)

Fls. borne close to main st. and branches, with leafy shoots at tip: flower-garden annual ..... 1. *I. Balsamina*

Fls. on long peduncles, mostly toward ends of branches: grown in greenhouse and sometimes in open. .... 2. *I. Roylei*

Spur very short. .... 3. *I. Sultani*

Spur long and slender. .... 4. *I. Holstii*

Lvs. prevailing ovate-lanceolate, long-tapering at base. .... 3. *I. Sultani*

Lvs. prevailing ovate, short- or not tapering at base ..... 4. *I. Holstii*

1. *I. Balsamina*, L. GARDEN BALSAM. Stout erect and branching annual to 2½ ft., pubescent or nearly glabrous: lvs. narrowly or broadly lanceolate, acuminate, deeply serrate, the petiole glandular: fls. large, short-peduncled, borne in the axils of the lvs. along the main st. and branches, overtopped by leafy shoots, in many colors from white to dark red, yellowish, and spotted; spur variable in length, incurved; standard orbicular and retuse; side petals or wings very broad, with the lateral lobes rounded and the terminal sessile and large: caps. large, tomentose. Trop. and subtrop. India, Malaya, China.—Runs into many forms, those in cult. being mostly double-fld.

2. *I. Roylei*, Walp. (*I. glanduligera*, Royle). Rather coarse much-branched annual to 1 ft. high: lower lvs. opposite, upper usually in 3's and whorled, ovate or ovate-lanceolate, sharply serrate: fls. 3 or more together in axillary long-peduncled clusters, very numerous toward top of plant, large, dark purple, the spur very short; standard 2-lobed; wings broad: caps. glabrous. (Named for John Forbes Royle, 1800-1856, writer on Indian plants.) Mts. of India.

3. *I. Sultani*, Hook. f. Erect branched glabrous perennial to 2 ft. high: lvs. prevailing ovate-lanceolate, long-tapering at base, crenate-serrate with a bristle in the angle of each serrature: fls. axillary, solitary or 2-3 together, 1-1½ in. across, originally rich scarlet but with pink and white vars.; lip less than half length of petals, suddenly narrowed into slender upward curved spur as long or twice as long as petals; standard obovate-orbicular, retuse; wings divided to base into 2 obovate-cuneate lobes: fr. apparently not forming in cult. (Named in compliment to the Sultan of Zanzibar.) Zanzibar.

4. *I. Holstii*, Engler & Warb. Very similar to *I. Sultani* and largely taking its place in cult., of quicker and more vigorous growth: it differs in the broader lvs. which are prevailing ovate, although the upper ones often ovate-lanceolate, short- or not tapering at base: fls. larger, to 1¾ in. across, brick red: branches striped with red. (Bears the name of Carl Holst, German collector in E. Afr.) E. trop. Afr.

## 99. RHAMNACEÆ. BUCKTHORN FAMILY

Erect or climbing trees or shrubs, rarely herbs, often spiny, of about 50 genera and 600 species of wide distribution.—Lvs. mostly alternate, simple, with minute deciduous stipules: fls. small, regular, bisexual or rarely polygamous, usually borne in cymes; calyx 4-5-lobed; petals 4-5 or 0; stamens 4-5, opposite petals and inserted with them at or below margins of fleshy disk which lines the calyx-tube, the filaments free, slender; ovary free or partly immersed in the disk, 2-4-celled, with 1 ovule in each cell, the stigma 2-4-lobed: fr. a drupe or caps.

Branchlets ordinary, not thickened or flattened.

Peduncles not becoming fleshy and club-shaped in fr.

Pubescence not of stellate hairs.

Fr. more or less fleshy.

Lvs. pinnate-veined.....1. RHAMNUS

Lvs. strongly 3-nerved from base.....2. ZIZYPHUS

Fr. dry.

Wing of fr. broad and horizontal.....3. PALIURUS

Wing lacking on fr.....4. CEANOTHUS

Pubescence of stellate hairs.....5. POMADERIS

Peduncles becoming fleshy and club-shaped in fr.....6. HOVENIA

Branchlets thickened or flattened into short spine-tipped bodies: lvs.

small or wanting.....7. COLLETIA

1. *RHAMNUS*, L. BUCKTHORN. About 100 species of deciduous or ever-green trees or shrubs, native mostly in temp. regions of the northern hemisphere, but a few extending into the tropics, planted for ornament.—Lvs. alternate or rarely nearly opposite, pinnate-veined, petioled, entire or dentate: fls. bisexual, polygamous or dioecious, in axillary clusters, umbels or racemes; sepals, petals, and stamens 4-5, or petals sometimes wanting; ovary 2-4-celled, free from the disk: fr. an oblong or globular drupe with succulent flesh, inclosing 2-4 separate nutlet-like stones. (Rham-nus: ancient Greek name.)—Some native species may be planted for ornament, but these should be sought in the local manuals.

Lvs. serrate: fls. dioecious, petals 4.....1. *R. cathartica*

Lvs. entire: fls. bisexual, petals 5.....2. *R. Frangula*

1. *R. cathartica*, L. COMMON BUCKTHORN. Deciduous shrub to 12 ft. or more high, the branchlets often tipped with stout spines: lvs. glabrous or slightly pubescent beneath, ovate or elliptic, 1½-3 in. long, regularly crenate-serrate: fls. dioecious, in 2-5-fl. clusters; sepals, petals and stamens 4; style usually 4-cleft: drupe black, about ¼ in. across, with 3-4 grooved nutlets. Eu., W. and N. Asia; escaped in E. U. S.—Often planted for hedges; the bark and fr. have medicinal properties and also yield a dye.



2. **R. Frangula**, L. **ALDER BUCKTHORN**. Unarmed shrub to 12 ft. high: lvs. glabrous, broadly obovate to obovate-oblong, 1 2½ in. long, entire or slightly undulate, dark green and shining above; fls. bisexual, in 1-6-fld. sessile umbels; sepals, petals, and stamens 5; style entire: drupe red, changing to black, about ¼ in. across, the 3 nutlets compressed, not grooved. (Frangula: pre-Linnean substantive name.) Eu., N. Afr., Cent. Asia; escaped in E. U. S.—There are several lf.-forms, var. *asplenifolia*, Dipp., having linear undulate lvs.

2. **ZIZYPHUS**, Adans. **JUJUBE**. Deciduous or evergreen trees or shrubs, of about 40 species, distributed in trop. and subtrop. regions of both hemispheres, a few grown for ornament or their edible frs.—Lvs. alternate, petioled, entire or serrate, 3-5-nerved from base, the stipules often transformed into spines: fls. in short axillary cymes; sepals, petals and stamens 5; ovary immersed in the disk and adnate to it at base, usually 2-celled and the style 2-parted: fr. a fleshy subglobose to oblong drupe. (Ziz-yphus: from Zizouf, the Arabian name of *Z. Lotus*, and with which the name jujube is also connected.)

**Z. Jujuba**, Mill. (*Z. sativa*, Gaertn. *Z. vulgaris*, Lam.). **COMMON JUJUBE**. Glabrous shrub or small tree to 30 ft., spiny or unarmed; branchlets often fascicled, slender and having frequently the appearance of pinnate lvs.: lvs. ovate to ovate-lanceolate, 1-3 in. long, obtuse and sometimes emarginate, serrate: drupe dark red or brown, oblong or ovoid, ½-2 in. long, with whitish flesh and a hard 2-celled stone. S. Eu., S. and E. Asia.—**Z. mauritiana**, Lam. (*Z. Jujuba*, Lam.), from S. Asia, Afr., and Australia, is also cult.: it differs chiefly in its branchlets, infl. and under sides of lvs. being densely tomentose.

3. **PALIURUS**, Mill. Six species of shrubs or small trees, native from S. Eu. to China and Japan, sometimes planted for ornament.—Lvs. alternate, petioled, entire or serrate, 3-nerved from base, the stipules usually changed into spines: fls. bisexual, in axillary or sometimes terminal cymes; sepals, petals and stamens 5; ovary partly immersed in the disk, 3-celled with 3 stigmas: fr. dry, depressed subglobose, with a broad orbicular horizontal wing, the whole fr. resembling a head with a broad-brimmed hat. (Paliu-rus: ancient Greek name.)

**P. Spina-Christi**, Mill. (*P. aculeatus*, Lam.). **JERUSALEM-THORN**. **CHRISTSTHORN** (in Latin, *Spina Christi*). Spreading or sometimes procumbent shrub or small tree to 20 ft.: stipular spines 2, one straight, the other hooked and recurved: lvs. ovate, ¾-1½ in. long, obtuse, rounded and unequal at base, minutely serrulate, glabrous, dark green above, pale or grayish beneath: fr. glabrous, brownish-yellow, ¾-1 in. across. S. Eu. to Himalayas and N. China.

4. **CEANOTHUS**, L. Deciduous and evergreen shrubs or small trees, of over 50 species in N. Amer., mostly in the Pacific Coast region, planted for their attractive fl.-clusters.—Lvs. alternate or sometimes opposite, petioled, entire or serrate, pinnate-veined or 3-nerved at base: fls. bisexual, in small umbels which are aggregated into dense axillary or terminal panicles or racemes; sepals, petals and stamens 5; ovary immersed in disk and adnate to it at base, 3-celled, the style 3-cleft: fr. 3-lobed, dry, separating longitudinally into 3 dehiscent nutlets. (Ceano-thus: ancient Greek name.)—Any of the species is likely to be cult., but these are described in local manuals; only those of garden derivation are entered here.

Lvs. deciduous, serrulate, 1½-4 in. long.

Under side of lvs. pubescent, the tips acute.....1. *C. Delilianus*

Under side of lvs. nearly glabrous or slightly pubescent on veins, the tips obtuse.....2. *C. pallidus*

Lvs. persistent, remotely denticulate, 1 in. or less long.

Lf. penninerved, obovate.....3. *C. Veitchianus*

Lf. distinctly 3-nerved at base, elliptic-oblong.....4. *C. Lobbianus*

1. **C. Delilianus**, Spach (*C. Arnouldi*, Carr. *C. hybridus*, Hort. *C. versailensis*, Schneid. *C. americanus* × *C. cærulea*). Upright shrub to about 3 ft. or more; young

branchlets finely pubescent: lvs. alternate, elliptic-ovate or ovate to oblong-ovate, 2-3 or sometimes to 4 in. long, acute or short-acuminate, rarely obtusish, rounded at base, serrulate, dark green and slightly pubescent above, pubescent or sometimes nearly tomentose beneath; petiole  $\frac{1}{8}$ - $\frac{1}{2}$  in. long: fls. pale to deep blue, in slender-stalked lateral spikes forming terminal panicles; rachis pubescent; pedicels slender, glabrous. (Named for A. R. Delile, French botanist of the early 19th century.) Originated in Eu. about 1825.

2. *C. pallidus*, Lindl. (*C. Delilianus*  $\times$  *C. ovatus*). Shrub similar to the preceding, but lower and less tender; young branchlets slightly pubescent or nearly glabrous, often purplish: lvs. elliptic- or ovate-oblong to oblong,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, obtuse, rounded or broadly cuneate at base, serrulate, slightly pubescent chiefly on the veins beneath; petiole  $\frac{1}{8}$ - $\frac{1}{4}$  in. long: fls. light blue, in rather short spikes on long leafy branchlets. Originated in Eu. probably between 1825 and 1830.—There is a form with pink fls. and larger lvs. and one with double nearly white fls. which are pink in bud.

3. *C. Veitchianus*, Hook. (*C. rigidus*  $\times$  *C. thyrsiflorus*). Upright shrub to 10 ft. or more, with spreading branches; young branchlets slightly pubescent, terete, green: lvs. alternate, short-petioled, obovate, obtuse, cuneate at base, rounded at apex,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, remotely denticulate with gland-tipped teeth, penninerved with about 3 pairs of veins, dark green and lustrous above, whitish and puberulous beneath: fls. deep blue, in short-peduncled heads 1-2 in. long forming at end of branches dense panicles; rachis pubescent; pedicels slender, glabrous. (Named for Veitch, page 103.) Raised about 1850 in England from Calif. seeds; occasionally found wild.

4. *C. Lobbianus*, Hook. (*C. dentatus*  $\times$  *C. thyrsiflorus*). Upright shrub to 10 ft. or more; young branchlets slightly pubescent, terete, green: lvs. alternate, short-petioled, elliptic-oblong to oblong, rounded or nearly so at base, obtuse,  $\frac{1}{2}$ -1 in. long, remotely denticulate with gland-tipped teeth, 3-nerved at base, dark green above, whitish and finely pubescent beneath: fls. dark blue, in dense heads 1-2 in. long and borne on slender axillary peduncles; rachis pubescent; pedicels slightly pubescent. (Named for Wm. Lobb, 1809-1863, botanical traveler.) Raised in England from Calif. seed about 1850; also found occasionally spontaneous.

5. **POMADERRIS**, Labill. Over 20 species of shrubs, native in Australia, New Zeal., and New Caledonia, sometimes planted for ornament in warm regions.—Plant more or less covered with hoary ferruginous stellate tomentum: lvs. alternate: fls. pedicelled, in small cymes, usually aggregated into many-fld. terminal or axillary corymbs or panicles; sepals, petals and stamens 5, or the petals wanting; disk inconspicuous; ovary partly inferior, usually 3-celled with 3-cleft style: fr. a small caps. which protrudes above the calyx-tube, 3-valved, separating into 3 nutlets. (Pomader-ris: from Greek for *lid* and *skin*, said to allude to the membranaceous covering of the caps.)

*P. apetala*, Labill. Shrub or small tree reaching 20 ft.: lvs. oblong-ovate or oblong-lanceolate, 2-4 in. long, petioled, irregularly crenulate, glabrous above, white-tomentose beneath or rusty on the prominent veins: panicles 3-7 in. long, the fls. greenish-white; calyx-tube stellate-tomentose; petals wanting: caps. obtuse, sparsely stellate-tomentose. Australia and New Zeal.

6. **HOVENIA**, Thunb. A monotypic genus comprising a deciduous shrub or small tree from China, Japan, and the Himalayas, planted for ornament.—Lvs. alternate, petioled, serrate, pinnate-veined or 3-nerved from base: fls. greenish, in many-fld. axillary or terminal racemes; sepals, petals and stamens 5; ovary free, 3-celled, the style 3-cleft: fr. indehiscent, obscurely 3-lobed, the peduncles becoming fleshy and club-shaped in fr. and sometimes eaten. (Hove-nia: after David Hoven, Dutch commissioner in Japan and of assistance to Thunberg in his researches.)

*H. dulcis*, Thunb. JAPANESE RAISIN-TREE. Round-headed tree to 30 ft., with spicy smell: lvs. ovate or cordate-ovate, acuminate, 3-7 in. long, almost glabrous or pubescent on veins beneath: fr. about  $\frac{1}{4}$  in. across, the peduncles reddish.

7. **COLLETIA**, Comm. Odd spiny shrubs of about a dozen species in S. Amer., sometimes grown under glass or in the open in warm regions.—Branch-

lets short, arranged in opposite pairs, thickened and often flattened, spine-tipped: lvs. opposite, small and simple, usually wanting: fls. fascicled or solitary at base of spines, nodding on 1-fl. pedicels, yellowish or white; sepals, petals and stamens 4-6, or petals wanting; disk inconspicuous or margin rolled in; ovary immersed in disk at base, 3-celled, the stigma 3-lobed: fr. a dry leathery 3-lobed caps., separating into 3 nutlets. (Colle-tia: Philibert Collet, 1643-1718, French botanist.)

*C. cruciata*, Gill. & Hook. (*C. horrida*, Hort.). Shrub to 4 ft., with elliptic flattened very broad-spined decurrent branches: lvs. few, elliptic, entire: fls. borne profusely in spring, white. S. Brazil, Uruguay.

100. VITACEÆ. VINE or GRAPE FAMILY

Known to us as tendril-climbing woody vines with long internodes, grown for ornament and for the produce of edible fr., but the family also includes erect shrubs and even small trees; some of the species are fleshy; genera a dozen and species more than 500, largely in tropics and warm-temp. regions.—Lvs. various, mostly alternate, simple or compound: fls. many and small, greenish and inconspicuous, variously clustered, bisexual or polygamo-dicæcious, 4- or 5-merous, in some genera provided with a prominent disk about the ovary; calyx entire or minutely toothed; petals either separately expanding or cohering and falling together as a "cap" (corolla gamopetalous in one genus not treated here); stamens prevailingly 4 or 5, opposite the petals; ovary superior, 2- or more-celled with mostly 2 ovules in each; style 1, or wanting: fr. a small berry.

|   |                   |
|---|-------------------|
| Hypogynous disk prominent in the fl.: tendrils without expanding tips.      |                   |
| Petals cohering into a cap, detaching at the base and falling together.     | 1. VITIS          |
| Petals separating and spreading.  |                   |
| Fls. 5-merous: plant not fleshy.  | 2. AMPELOPSIS     |
| Fls. 4-merous: plant often fleshy.  | 3. CISSUS         |
| Hypogynous disk absent or not evident: tendrils usually with expanded tips. | 4. PARTHENOCISSUS |

1. VITIS, L. VINE. GRAPE. Variable vines, with indefinite specific limits, of probably 50 recognizable species in warm and temp. regions well around the world.—Lvs. simple, more or less palmately lobed: plant climbing by coiling tendrils (in ours) which are simple or forked, and are either continuous (opposite every lf.) or intermittent (lacking at every third node): fls. mostly in thyrses that take the place of tendrils and sometimes bear a tendril-branch, mostly actually or functionally unisexual, 5-merous, the calyx minute; petals not expanding but cohering and separating at the base, falling together; disk glanduliferous and prominent: fr. a soft pulpy berry. (Vi-tis: the classical Latin name.)—The wine grape (*V. vinifera* of the Old World) produces the prevailing vineyard kinds of Calif. and also for cult. under glass; the vineyard grapes of other parts are derived from native species; many of them are hybrids. N. Amer. is rich in Vitis and species may be expected in botanic gardens and test-grounds. E. Asian species are similarly more or less in cult. The characteristic American vineyard grapes may be described here in terms of their supposed original species, which are of the *Labrusca*, *Æstivalis*, and *Rotundifolia* groups. Other species have yielded pomological vars. of very minor importance, perhaps not now cult., and need not be considered in this account.

- Species with forked tendrils, bark on yearling and older canes shredding, nodes with cross-partition or diaphragm.
- Fr. soft and edible, the plants of the kind grown for the grapes
- Tendrils (or fl.-clusters) intermittent.

- Skin and pulp of ripe fr. usually closely adhering.....1. *V. vinifera*  
 Skin loose from the flesh, so that the grape can be "pulped."  
 Young shoots and under surface of lvs. gray or whitish.....2. *V. Girdiana*  
 Young shoots and under surfaces rusty-tomentose.  
 Berries small,  $\frac{1}{8}$  in. or less diam. in the wild state.....3. *V. æstivalis*  
 Berries large, usually  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam.....4. *V. Linsecornii*  
 Tendrils mostly continuous.  
 Berries few in short nearly simple often globular clusters.....5. *V. Labrusca*  
 Berries many in large usually pointed or shouldered clusters.....6. *V. Labruscana*  
 Fr. small and hard, the plant grown for ornament.....7. *V. Coignetiae*  
 Species with simple tendrils, bark not peeling in shreds, and nodes without diaphragm.....8. *V. rotundifolia*

1. *V. vinifera*, L. The GRAPE of history. Strong vine of medium altitude but often trained to a short stout trunk; young growth glabrous or somewhat floccose: tendrils (or clusters) intermittent: lvs. rather thin, circular or circular-ovate in outline, 4-9 in. broad, margins coarsely and more or less acutely toothed or jagged, basal sinus deep and the lobes often overlapping, those on young growths more or less lobed, glabrous or somewhat tomentose beneath at maturity: clusters large and long, the berries often oval or oblong, the skin not readily separating from the pulp. Probably native in S. E. Eu. to W. India, now widely dispersed and in many forms.—Var. *apiifolia*, Loud., has dissected lvs., sometimes grown for ornament.

2. *V. Girdiana*, Munson. Strong climbing vine in S. Calif. along streams in the foothills, hybridizing with *V. vinifera*, one of the supposed mixtures being the Mission grape: foliage light grayish-green, the young growth densely whitish-woolly: tendrils intermittent: lvs. broadly cordate-ovate to long-cordate, 4-7 in. broad, the teeth large, convex and acute, the basal sinus acute or rounded and the lobes sometimes overlapping: berries  $\frac{1}{8}$  in. or less diam., black with little or no bloom, with tough skin, becoming sweet when very ripe; bears the name of H. H. Gird of S. Calif. who brought it to the attention of Munson.

3. *V. æstivalis*, Michx. SUMMER or PIGEON GRAPE. Tall climber with reddish-fuzzy young growth: tendrils intermittent: lvs. becoming rather thick, ovate-cordate to circular-cordate in outline, 4-7 in. broad, strongly dentate, 3-5-lobed or strongly angled, basal sinus various, apex broadly triangular, upper surface dull and becoming glabrous, the under surface rusty-tomentose or pubescent with tufts in the axils of veins: clusters usually long-peduncled, not greatly branched: berries small, usually  $\frac{1}{8}$  in. or less diam., glaucous-black, with tough skin and dry astringent flesh. New England to Fla., Wis., and Kans.—Represented in cult. by Norton (Norton's Virginia) either direct or as a hybrid, and supposed to enter into other races.

Var. *Bourquiniana*, Bailey (*V. Bourquiniana*, Muns.). SOUTHERN ÆSTIVALIS, is apparently a cultural offshoot represented in such vars. as Herbemont, Lenoir, Rulander: it has thinner lvs. and only slightly reddish tomentum, berries large and juicy, black or amber-colored. Cultigen, perhaps of foreign origin and probably to be associated with *V. vinifera*; bears the name of Gougie Bourquin of Ga., associated with the history of the group.

4. *V. Linsecornii*, Buckley. POST-OAK GRAPE. The southwestern representative of *V. æstivalis*, but more stocky, lvs. larger and densely tomentose beneath and often not rust-colored; berries larger, mostly  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam., mostly palatable in the wild state. S. W. Mo. to E. La. and Tex., a few vars. for those regions having been somewhat introduced into cult. (Named for Dr. Gideon Linsecorn or Linsecorn.)

5. *V. Labrusca*, L. FOX GRAPE. Strong high climber with tawny tomentum on young parts and continuous tendrils: lvs. large and heavy, broadly cordate-ovate to deltoid-ovate, 4-8 in. broad, margins somewhat scallop-toothed with mucros or nearly entire, obscurely 3-lobed toward apex except on strong shoots where the lobes may be one-half the width of blade, basal sinus mostly shallow and open, upper surface dull and becoming glabrous, lower surface with dull white or reddish tomentum: cluster short, nearly or quite simple and often as broad as long, developing few berries which are large and nearly globular,  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam., purple-black to red-brown, sweetish or astringent, with a strong musky or "foxy" flavor. (*Labrusca* is Latin for the wild vine.) New England to Ga. and S. Ind.; rarely transferred to grounds for its abundant attractive foliage.

6. *V. Labruscana*, Bailey. The Labruscan vineyard grapes, of which *V. Labrusca* is the source, as Concord, Worden, Hartford, Vergennes, or the dominant parent as in Isabella, Iona, Niagara, Diana, Catawba, Brighton. The other parentage in most of the crosses is *V. vinifera*. The Labruscans are distinguished from the native *V. Labrusca* in the larger and usually shouldered and conic or thyrsoïd



cluster, larger berries of various colors and the more ameliorated pulp and less foxy flavor; lf. characters vary as between the different kinds, for the most part less tomentose than in *Labrusca*; tendrils often intermittent.

7. *V. Coignetiae*, Pulliatt. Very strong vigorous hardy vine grown for ornament and sometimes called "Crimson Glory Vine" from the bright autumn coloring of the heavy abundant foliage; young growth floccose-tomentose: tendrils intermittent: lvs. cordate-orbicular with 3 or 5 lobe-like points, 6-10 in. broad, shallowly apiculate-toothed, dull above and gray- or tawny-tomentose beneath: cluster long or short and branched: fr. globular, about  $\frac{1}{2}$  in. diam., scarcely edible. N. Japan; dedicated to Mme. Coignet, Lyons, France.

8. *V. rotundifolia*, Michx. (*Muscadinia rotundifolia*, Small). MUSCADINE. Long-climbing nearly or quite glabrous hard-wooded vine with usually simple intermittent tendrils, often emitting aerial roots: lvs. medium, cordate-circular to cordate-ovate, 2-6 in. across, strongly angular-notched but not lobed, the basal sinus open, without tomentum: fr. few to 20 in a nearly globular bunch, spherical or nearly so,  $\frac{1}{2}$ -1 in. diam., dull purple and not glaucous, with thick tough skin and musk-tasting flesh. S. Del. to Fla., Kans., and Tex.—Several vineyard vars. are in cult., particularly the Scuppernong with silvery amber-green berries.

2. AMPELOPSIS, Michx. Some 25 species of mostly tendril-bearing ornamental vines of N. Amer. and Asia.—Technically the genus differs from *Vitis* in the absence of shredding bark, by cymose rather than paniculate infl., bisexual fls., and the spreading petals which fall separately: lvs. alternate, simple or compound: tendrils forking and not dilated at tips: fls. 5-merous for the most part; stamens short and as many as the petals; disk prominent, adnate to the 2-celled slender-styled ovary: fr. a small 1-4-seeded berry. (Ampelop-sis: Greek *vine-like*, *ampelos* being the vine, *Vitis*).—The principal one in cult. is apparently *A. brevipedunculata* var. *elegans*; the distinctions are likely to be confused, and therefore descriptions are here given of several kinds that may be little planted.

Species with simple sometimes deeply lobed lvs.

Lvs. thin, green underneath.....1. *A. brevipedunculata*

Lvs. firm or thick in texture, whitish or gray underneath.

Fr. pale blue to yellow: lvs. bright green-shining above.....2. *A. humulifolia*

Fr. dark blue: lvs. with velvety sheen above.....3. *A. micans*

Species with digitately divided lvs.....4. *A. acunifolia*

Species with pinnately compound lvs.

Lfts. obtusely or crenate-dentate.....5. *A. megalophylla*

Lfts. strongly sharp-notched.

Under side of lfts. more or less hairy.....6. *A. arborea*

Under side glabrous.....7. *A. orientalis*

1. *A. brevipedunculata*, Koehne (*A. heterophylla* var. *amurensis*, Planch.). Tendril-climbing, the slender young parts and the petioles hairy: lvs. cordate-ovate, 2-4 in. across, slightly 3-lobed or shouldered above the middle, short-acuminate, crenate-dentate with apiculate points, the basal sinus broad, hairy beneath at least on the prominent veins: cymes short and rather dense, not equaling the lvs.: fr. blue to lilac. Japan, Manchuria, N. China. —Var. *Maximowiczii*, Rehd. (*A. heterophylla*, Sieb. & Zucc. *Vitis heterophylla*, Thunb.). Lvs. deeply 3-lobed, st. and foliage more glabrous. Var. *citrulloides*, Bailey. Lvs. still more deeply and narrowly lobed, with broad open sinuses, the middle lobe constricted at base and at or above the middle, the lateral lobes often again lobed so that the lf. appears to be primarily 5-lobed. Var. *elegans*, Bailey (*A. tricolor* and *A. variegata*, Hort.). The common cult. form with lvs. variegated white, greenish, or yellowish and sometimes pink.

2. *A. humulifolia*, Bunge. Differs from No. 1 by the firmer texture of lvs. that are pale or whitish underneath, and in the small pale yellow or pale blue frs.: lvs. broad-ovate, 3-4 in. broad, 3-5-lobed or sometimes the lobes little evident, acute or acuminate, base truncate or subcordate, lustrous-green above, glaucous and either glabrous or hairy beneath: cymes slender-peduncled. N. China.

3. *A. micans*, Rehd. Strong climbing grape-like vine, with purplish glabrous young growth: lvs. large and rather thick, cordate-ovate to triangular-ovate, 3-6 in. across, shouldered or shallowly lobed or not lobed, the point broad and nearly or quite obtuse, basal sinus shallow and open, margins crenate-toothed with apiculate points, velvety-lustrous above, somewhat glaucous and nearly or quite glabrous beneath: cymes rather dense, long-stalked: fr. dark blue. Cent. China.

4. *A. aconitifolia*, Bunge. Slender tendril-climber with glabrous young growth: lvs. broad-ovate to nearly circular in outline, 2-4 in. across, digitately 5-parted, the parts strongly toothed and sometimes more or less cut and divided, points acuminate, light green beneath, glabrous or somewhat hairy beneath on the veins: fr. small, orange, sometimes becoming bluish. N. China.—Cut-leaved forms are sometimes known as var. *dissecta*.

5. *A. megalophylla*, Diels & Gilg. Strong glabrous and more or less glaucous tendril-climber, making very large winter-buds: lvs. large, pinnate or bipinnate, 6-16 in. long, pale and somewhat glaucous beneath; lfts. or segms. several to many, ovate to ovate-oblong, 2-5 in. long, more or less acuminate, rounded or subcordate at base, crenate-serrate: cymes loose: fr. bluish-black. W. China.

6. *A. arborea*, Koehne (*Cissus arborea*, Des Moul. *Vitis bipinnata*, Torr. & Gray). PEPPER-VINE. Bushy, more or less climbing, tendrils sometimes small or wanting, young growth nearly or quite glabrous: lvs. bipinnate and finely divided, ornamental, 3-9 in. long; lfts. or segms. mostly ovate,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, deeply notched, hairy on the veins and in the axils beneath and also on the rachis: fls. often 4-merous: fr. black-purple. Va. to Fla., Mo., and south.

7. *A. orientalis*, Planch. Bushy or more or less climbing, much like No. 6 but lvs. less cut and mostly 1-pinnate or the lower lfts. again pinnate, lfts. or segms. 2-3 in. long and glabrous on the rachis and also on under surface except for tufts on the axils of veins: fls. 5-merous: fr. blue to purple. S. W. Asia.

3. *CISSUS*, L. Species 200 or more, wide-spread in trop. and warm-temp. regions, a few grown for ornament.—Erect or tendril-climbing (ours of the latter kind), distinguished from *Vitis*, with which it has been united, by the expanding separate petals, 4-merous fls., largely evergreen foliage, and often fleshy or somewhat succulent lvs. and plant body: sts. often herbaceous: lvs. simple or compound: fls. bisexual or polygamo-dicæious; disk 4-lobed: fr. a small 1-4-seeded inedible berry. (Cis-sus: Greek name of *ivy*.)

Lvs. simple, but sometimes lobed.

Lf.-blade large, broad, and grape-like.....1. *C. capensis*

Lf.-blade not grape-like, longer than broad.

Branchlets pubescent: lvs. green.....2. *C. antarctica*

Branchlets glabrous: lvs. colored.....3. *C. discolor*

Lvs. 3-5-foliolate.

Lfts. rhombic, 1-4 in. long.....4. *C. rhombifolia*

Lfts. cuneate-obovate, much smaller.....5. *C. striata*

1. *C. capensis*, Willd. (*Vitis capensis*, Thunb.). Strong climbing evergreen grape-like vine, used in S. Calif. for arbors, producing globular ground tubers 6-8 in. diam.; young growths rusty-tomentose: tendrils very long, forked: lvs. simple, long-petioled, blade nearly orbicular to reniform, with 3 strong nerves from base, 4-8 in. across, strongly repand-dentate, becoming glabrous above except perhaps along the ribs, rusty-tomentose beneath: fr. globular, in short clusters, about  $\frac{1}{2}$  in. diam., red-black and glossy, said to be good for cooking. S. Afr.

2. *C. antarctica*, Vent. Upright shrub with tendril-climbing branches, hairy-pubescent on young growths: lvs. ovate to oblong, 2-3 $\frac{1}{2}$  in. long, short-acuminate, subcordate at base, shallowly upwardly toothed, glabrous and glossy above: fr. a globular few-seeded small berry. Australia; sometimes grown in cool greenhouses and also in the open in S. Calif.

3. *C. discolor*, Blume. Slender glabrous tendril-climber with red shoots: lvs. oblong-ovate to cordate-ovate, 4-6 in. long, gradually acuminate, basal sinus narrow, margins closely apiculate-serrate, highly colored—rich green above with white and pink and red-purple over-colors, purplish beneath: fr. globular, small, 1-seeded. Java; a greenhouse foliage plant.

4. *C. rhombifolia*, Planch. Evergreen tendril-climber with loose-hairy wingless shoots: lfts. 3, stalked, rhombic-ovate, 1-4 in. long, pointed, sharp-toothed, reddish-hairy on veins beneath: peduncles glandulose-pubescent, the cymes 20-30-fld.: fr. small, globose, glabrous. N. S. Amer.

5. *C. striata*, Ruiz & Pav. (*Ampelopsis sempervirens*, Hort.). Low and shrubby small-leaved somewhat pubescent evergreen with tendril-climbing branches: lvs. digitately 3-5-foliolate, coriaceous; lfts. mostly 1 in. or less long but on vigorous plants or shoots to 3 in. long, cuneate-obovate to spatulate, small-dentate toward apex, glabrous: fr. small, depressed-globose, 2-4-seeded. Peru, Chile to S. Brazil; grown in cool greenhouse and in the open in Calif.

4. **PARTHENOCISSUS**, Planch. (*Psedera*, Neck.). Ten to 12 woody tendril-climbers in N. Amer. and Asia, two of them commonly grown for covering walls and arbors.—From *Vitis* and closely related genera distinguished by disk-like tips of tendrils on some of the species, absence of prominent hypogynous disk in the fl., petals expanding and falling separately: lvs. alternate, digitate or lobed: fls. mostly bisexual, in compound cymes, usually 5-merous; ovary 2-celled, each cell 2-ovuled: fr. a small 1-4-seeded berry. (Parthenocissus: Greek *virgin ivy*.)

- Lvs. 3-foliolate or -lobed.....1. *P. tricuspidata*  
 Lvs. 5-foliolate.  
 Branchlets 4-angled: lvs. usually with whitish marking and purple  
 beneath.....2. *P. Henryana*  
 Branchlets terete: lvs. green both sides.....3. *P. quinquefolia*

1. ***P. tricuspidata***, Planch. (*Ampelopsis tricuspidata*, Sieb. & Zucc. *A. Veitchii*, Hort.). JAPANESE or BOSTON IVY. Glabrous high-climbing vine with lustrous foliage, clinging closely by means of short branched disciferous tendrils: lvs. variable, on young shoots or plants ovate to cordate-ovate or cordate-orbicular and few-toothed, more or less 3-lobed toward apex, 2-4 in. across, on older or established plants much larger and often 3-foliolate, becoming 8 in. across, the lfts. sessile: fr. bluish-black, more or less glaucous. Japan, China.—Var. *Lowii*, Rehd. (*P. Lowii*, Hort.), has very small lvs. 1½ in. or less long, purplish when young and brilliant red in autumn, the plant slender and smaller.

2. ***P. Henryana***, Diels & Gilg (*Vitis Henryana*, Hemsl.). Glabrous climber with 4-angled young growth, the tendrils slender-branched and with adhesive tips: lvs. purplish beneath and usually with whitish markings above; lfts. 5, elliptic-ovate to obovate, serrate above the base, 2½ in. or less long, stalked, glabrous both sides or somewhat pubescent on veins beneath: cymes narrow: fr. about 3-seeded, dark blue. (Named after Augustine Henry, British botanist who has collected extensively in China.) Cent. China.

3. ***P. quinquefolia***, Planch. (*Ampelopsis quinquefolia*, Michx.). VIRGINIA CREEPER. Very strong high-climbing vine, the branching tendrils with expanded adhesive tips and the old sts. often emitting roots; young growth purplish: lfts. 5, rather thick, elliptic-ovate to more or less obovate, 3-6 in. long, pointed and coarsely toothed, prominently petiolulate, dull green above, much lighter and more or less glaucescent and light-pubescent beneath: cymes paniculate: fr. about ¼ in. diam., bluish-black, more or less glaucous. E. N. Amer.; variable.—Var. *Engelmannii*, Rehd. (*P. Engelmannii*, Graebn.), offered in the trade, is a form with smaller foliage. Var. *hirsuta*, Planch. (*P. hirsuta*, Small), young parts and lvs. soft-pubescent, occurs in the S. Var. *vitacea*, Bailey (*P. vitacea*, Hitchc.), is a race with tendrils usually lacking terminal disks and therefore less clinging to walls, young growth green rather than purplish, lvs. thinner and light green beneath, cymes more dichotomous; there are several subraces, as a somewhat laciniate form and a large-leaved form sometimes listed as *Ampelopsis Roylei*, Hort.

## 101. TILIACEÆ. LINDEN or BASSWOOD FAMILY

Trees, shrubs or rarely herbs, of about 35 genera and 370 species, widely distributed in warm and trop. regions, but a few in temp. zones, the lindens being among the best-known ornamental trees.—Bark fibrous, with mucilaginous properties: lvs. usually alternate, simple, entire, dentate or lobed, stipules mostly small and deciduous: fls. regular, bisexual or rarely unisexual, usually in axillary or terminal cymes or panicles; sepals 5, rarely 3 or 4; free or connate, valvate, deciduous; petals 5 or fewer, or none, alternate with sepals, often glandular at base; stamens numerous, the filaments free or in fascicles of 5-10, some perhaps only staminodia; ovary superior, 2-10-celled with 1 to many ovules in each cell, the style entire or lobed: fr. a caps., drupe or berry, dehiscent or indehiscent, 1-10-celled.

- Peduncles adnate for about half their length to membranaceous bract:  
 fr. indehiscent, nut-like.....1. *TILIA*  
 Peduncles free: fr. a dehiscent caps.  
 Stamens all anther-bearing.....2. *CORCHORUS*  
 Stamens not all anther-bearing, the outer ones staminodia.....3. *SPARMANNIA*

1. **TILIA**, L. LINDEN. BASSWOOD. WHITEWOOD. LIME. About 30 species of deciduous trees native of the north temp. zone, planted for shade, ornament and avenues; some yield valuable timber and the tough inner bark is manufactured into mats, cords and the like.—Winter-buds axillary, large, with numerous imbricated scales: lvs. long-petioled, usually cordate, serrate: fls. small, fragrant, nectar-bearing, in long-peduncled drooping cymes, the peduncle adnate for about half its length to a membranaceous ligulate bract; sepals and petals 5, the latter often with a small scale at base; stamens numerous, free or in 5 clusters, sometimes with petaloid staminodia opposite the petals; ovary sessile, 5-celled, the stigma 5-lobed: fr. indehiscent, nut-like, globose or ovoid, 1-2-seeded. (Til-ia: classical Latin name.)

Lvs. glabrous beneath, except axillary tufts of hairs.

Length of lvs. 4-6 in.: fls. with staminodes.....1. *T. glabra*

Length of lvs. 1½-2½ in.: fls. without staminodes.....2. *T. cordata*

Lvs. pubescent beneath.

Under side of lvs. lightly pubescent, also with axillary tufts of hairs. 3. *T. platyphyllos*

Under side of lvs. white-tomentose, without axillary tufts of hairs.

Branches upright.....4. *T. tomentosa*

Branches pendulous.....5. *T. petiolaris*

1. ***T. glabra***, Vent. (*T. americana*, L.). Round-headed tree to 120 ft., with deeply furrowed bark: lvs. broad-ovate, 4-6 in. or more long, abruptly acuminate, obliquely cordate or truncate at base, coarsely serrate with incurved long-pointed teeth, dark green above, light green and glabrous beneath except tufts of hairs in axils of lateral veins but wanting at base, turning yellow in autumn: fls. about ½ in. long, with staminodes: fr. ovoid or globose, ½-¾ in. long, not ribbed, tomentose, thick-shelled. Canada south to Va., west to Neb. and Tex.—A large-leaved form is var. *macrophylla*, Hort. (var. *mississippiensis*, Hort.). A hybrid of unknown origin between *T. glabra* and *T. petiolaris* or *T. tomentosa* is *T. spectabilis*, Dipp. (*T. alba spectabilis*, Hort.). Of vigorous growth: lvs. similar to *T. glabra* but slightly grayish-tomentose beneath with long hairs on the veins, without axillary tufts: infl. tomentose, blooming several weeks earlier than *T. tomentosa*. Var. *Moltkei*, Rehd., originated in Spaeth's nursery in Germany: lvs. larger than in *T. spectabilis* and often without long hairs on veins.

2. ***T. cordata***, Mill. (*T. ulmifolia*, Scop. *T. parvifolia*, Ehrh. *T. europæa*, L., in part). SMALL-LEAVED LINDEN. To 100 ft. high: lvs. nearly orbicular, often broader than long, 1½-2½ in. long, abruptly acuminate and cuspidate, cordate at base, finely serrate, dark green above, glaucous and glabrous beneath with axillary tufts of brown hairs: fls. about ½ in. across, in nearly upright cymes, without staminodes: fr. globose, about ¼ in. diam., tomentose, faintly ribbed, with thin fragile shell. Eu.—There is a form with narrow pyramidal habit. The CRIMEAN LINDEN, ***T. euchlora***, Koch (*T. dasystyla*, Kirchn., not Stev.), is supposed to be a hybrid between *T. cordata* and *T. rubra*, DC. Lvs. dark green and glossy above, paler green beneath, 2-3 in. long, the teeth having slender points: fr. thick-shelled.

3. ***T. platyphyllos***, Scop. (*T. grandifolia*, Ehrh. *T. europæa*, L., in part). LARGE-LEAVED LIME. To 120 ft. high: lvs. orbicular-ovate, 3-4 in. long, obliquely cordate at base, abruptly acuminate, serrate, dull green above, light green and lightly pubescent beneath, with axillary tufts of hairs: fr. globose, ovoid or pyriform, tomentose, strongly 3-5-ribbed, apiculate, thick-shelled. Eu.—Runs into many forms, one of pyramidal habit, one with young branches red, and one with lvs. slightly 3-lobed. A deeply cut-leaved form is var. *laciniata*, Henry (var. *asplenifolia*, Kirchn.). Presumably a spontaneous hybrid between *T. platyphyllos* and *T. cordata* is *T. vulgaris*, Hayne (*T. intermedia*, DC. *T. europæa*, L., in part). It differs from the former in its lvs. being glabrous beneath except for axillary tufts of hairs and the fr. not ribbed, and from the latter in the under side of the lvs. green, not glaucous, the teeth short-pointed, the fr. thick-shelled.

4. ***T. tomentosa***, Moench (*T. argentea*, DC. *T. alba*, Ait.). WHITE LINDEN. Tree of upright dense habit, to 100 ft.; young branchlets stellate-tomentose: lvs. nearly orbicular, 3-5 in. long, truncate or cordate at base, abruptly acuminate, serrate or slightly lobed, white-tomentose beneath: infl. tomentose: fr. ovoid, ¼-nearly ½ in. long, tomentose, slightly 5-angled, shell woody. E. Eu., Asia Minor.

5. ***T. petiolaris***, Hook. f., not DC. WEEPING WHITE LINDEN. Very similar to *T. tomentosa* and perhaps only a var. of it, differing in its pendulous branches, more finely serrate lvs., longer petioles, and 5-furrowed fr. Known only in cult.



2. **CORCHORUS**, L. Herbs or subshrubs, of about 35 species, widely dispersed in the tropics, a few grown for their fiber called "jute" and the young shoots used for pot-herbs.—Lvs. serrate: fls. small, yellow, solitary or in few-fld. cymes; sepals and petals 5, rarely 4; stamens 10 to many, free, all anther-bearing; ovary 2-5-celled: fr. a subglobose or elongated caps. loculicidally dehiscent by 2-5 valves, sometimes with transverse partitions between the seeds. (Cor-chorus: from Greek referring to some reputed medicinal quality, as an eye remedy, of one of the species.)—The corchorus of trade-lists is usually *Kerria japonica*.

Caps. globose, not beaked.....1. *C. capsularis*  
Caps. elongated, beaked.....2. *C. olitorius*

1. **C. capsularis**, L. **JUTE**. Annual, growing 15 ft. high, with straight st. branching only near top: lvs. oblong, 2-4 in. long, serrate, the 2 lower teeth prolonged into sharp points: caps. globose, wrinkled, dehiscing into 5 valves, without transverse partitions. India, but escaped from cult. in other trop. countries.

2. **C. olitorius**, L. **NALTA JUTE**. **JEWS-MALLOW**. Very similar to the above but differing in its almost cylindrical caps. about 2 in. long, dehiscing by 3-6 valves, with transverse partitions between the seeds. India; naturalized widely in tropics.

3. **SPARMANNIA**, L.f. Five or more species of African shrubs or trees, one grown in greenhouses and out-of-doors in warm regions.—Pubescence soft, stellate: lvs. cordate, dentate or lobed: fls. white, in bracted terminal cymose umbels; sepals and petals 4; stamens numerous, free, the outer not anther-bearing; ovary 4-celled: fr. a globose spiny caps. loculicidally dehiscent by 4 valves. (Sparman-nia: after Andreas Sparmann, about 1748-1787, Swedish naturalist.)

**S. africana**, L. f. Large shrub or tree to 20 ft., often forming many trunks: lvs. long-petioled, cordate-acuminate, from 3-9 in. long, unequally toothed, 5-7-angled: fls. long-pedicelled, 1-1½ in. diam., white with yellow stamens, in cymes sometimes 4 in. across: caps. about ½ in. across. S. Afr.—There is a double-fld. form.

## 102. MALVACEÆ. MALLOW FAMILY

A well-marked family of 40-50 genera and upwards of 900 species in temp. and trop. countries around the world, yielding fiber and ornamental and a few food plants.—Herbs, shrubs, and trees with alternate simple mostly palmately-veined and -lobed lvs. and small deciduous stipules: fls. regular and bisexual, only exceptionally unisexual, prevailing 5-merous, white, yellow or various shades of red and purple, marked by the many stamens cohering into a tube about the pistil and which is often adnate to the 5 petals; sepals 5, often united and frequently subtended by calyx-like bracts or involucl; ovary superior, only rarely 1-celled, mostly 2- to many-celled, with 1 to several ovules in each cell; styles commonly as many as the carpels, mostly united below: fr. capsular and the carpels loculicidal or falling apart separately, or sometimes berry-like. *N*, Fig. 10, page 387.

A. Fr. (and ovary) composed of a single ring of carpels that separate at maturity from the central axis.

B. Column of stamens bearing anthers only at or very near the apex.

C. Ovule solitary in each cell, ascending.

D. Stigma linear, on the inner side or face of the pointed style-branches.

E. Staminal column simple, of one series of stamens.

F. Involucl of 1-3 distinct bracts, or wanting.

G. Petals obovate: carpels without beaks or appendages... 1. *MALVA*

GG. Petals usually truncate: carpels beaked and with transverse appendages inside and underneath the beak.... 2. *CALLIRHOË*

FF. Involucl of 3-9 connate bracts.

G. Axis of fr. surpassing the carpels, forming a cone or projection in the center..... 3. *JAVATERA*

GG. Axis not extending beyond the ring of carpels..... 4. *ALTHÆA*

- EE. Staminal column of two series, the outer one in 5 parts or clusters..... 5. *SIDALCEA*  
 DD. Stigma capitate or club-shaped, occupying the end of the style-branch..... 6. *MALVASTRUM*  
 CC. Ovules 2 or more in each cell.  
   D. Involucel of 3 bracts..... 7. *SPHERALCEA*  
   DD. Involucel lacking..... 8. *ABUTILON*  
 BB. Column of stamens bearing anthers below the top and more or less along the sides, the apex itself sterile and 5-toothed.  
   C. Involucel of many bracts: carpels connate into a fleshy or berry-like body but later separating..... 9. *MALVAVISCUS*  
   CC. Involucel of 5-8 bracts: fr. dry..... 10. *PAVONIA*  
 AA. Fr. (and ovary) composed of a pile or cone of carpels (like a raspberry) connate about the axis..... 11. *MALOPE*  
 AAA. Fr. a loculicidal caps.  
   B. Style club-shaped and undivided or at least its divisions erect: seeds obovoid or angled.  
   C. Involucel of very small or narrow bracts..... 12. *THESPESIA*  
   CC. Involucel of large cordate bracts.  
     D. Bracts usually deeply cut and mostly cordate: seeds with long lint..... 13. *GOSSYPIMUM*  
     DD. Bracts entire, not cordate: seeds without lint..... 14. *INGENHOUZIA*  
 BB. Style-branches short and broad, making a capitate lobed radiating stigma: seeds usually kidney-shaped..... 15. *LAGUNARIA*  
 BBB. Style-branches slender and at maturity spreading: seeds usually kidney-shaped..... 16. *HIBISCUS*

1. **MALVA**, L. **MALLOW**. Herbs, grown in the border and the flower-garden; about 30 species in Eu., N. Afr., Asia, several naturalized in N. Amer.—Annual, biennial, or perennial, hirsute or nearly glabrous: lvs. angled, lobed or dissected: fls. solitary in the axils or clustered, sessile or peduncled, involuclate by 3 or rarely 2 distinct small bractlets; calyx 5-cleft; petals 5, notched at the apex, rose-colored or white: fr. consisting of round-reniform, beakless, compressed 1-seeded carpels cohering in a depressed circle around the axis and at length separating from it and from each other. (Mal-va: old Latin name from Greek, referring to the emollient lvs.)

Fls. large and showy,  $1\frac{1}{2}$ -2 in. across.

Fr. not prominently wrinkled.

St.-lvs. 5-parted and the parts 1-2-parted or -cleft: fr. downy..... 1. *M. moschata*

St.-lvs. only once 5-parted or -cleft: fr. glabrous..... 2. *M. Alcea*

Fr. prominently wrinkled-veiny..... 3. *M. sylvestris*

Fls. small and inconspicuous, whitish..... 4. *M. crispa*

1. ***M. moschata***, L. **MUSK MALLOW**. Perennial, 1-2 ft. high, with mostly simple pubescence: lower lvs. suborbicular, rather shallowly incised; st.-lvs. 5-parted, the divisions 1-2-parted or -cleft into linear segms: fls. large and showy, rose or white, only from the upper axils, surpassing the subtending lvs.; calyx long-hairy: fr. downy, not wrinkled. Eu.; cult. and escaped.

2. ***M. Alcea***, L. Much like *M. moschata*, but the pubescence stellate and the st.-lvs. 5-parted into toothed or barely incised divisions: fls. larger, deep rose to white; calyx densely stellate-pubescent: fr. glabrous, minutely wrinkled or veiny. (*Alcea*: Greek, in reference to medicinal effect; an old name adopted by Linnaeus.) Eu.; cult. and escaped.—A var. has lvs. less incised.

3. ***M. sylvestris***, L. Biennial perhaps sometimes perennial, or grown as annual, 2-3 ft. high, erect, branching, rough-hairy: lvs. round-cordate or reniform, with 5-7 obtuse crenate lobes: fls. purple-rose, large, borne in the axils of most of the lvs. and surpassed by the petioles; petals three times as long as the calyx: fr. prominently wrinkled-hairy. Eu., temp. Asia, waysides N. Amer.—Var. *mauritiana*, Boiss. (*M. mauritiana*, L.). Height to 4 ft.: sts. and petioles more or less strigose-hairy: lvs. more shallowly and more obtusely lobed: fls. purple, the petals less deeply emarginate. Another var. has variable fls., usually white striped with purple.

4. ***M. crispa***, L. **CURLED MALLOW**. Unbranched annual 4-8 ft. high, leafy throughout, the sts. sometimes 3 in. thick at base: lvs. rounded, 5-7-lobed or -angled, the margins attractively crisped and curled: fls. whitish, small and inconspicuous, about  $\frac{1}{4}$  in. across, in dense axillary clusters surpassed by the petioles of the subtending lvs. Eu.; sparingly escaped from old gardens.

2. **CALLIRHOË**, Nutt. **POPPY MALLOW**. Herbs with showy fls., suitable for planting out-of-doors; 9 species native to N. Amer.—Perennials (mostly

with thick root) or annuals: lvs. alternate, with lobed or cleft blades or more finely dissected: fls. mostly crimson-purple or flesh-colored, axillary or sometimes in terminal racemes, the petals irregularly cut or truncate at apex, in this differing from the notched petals of *Malva*; involucl of 1-3 bracts or wanting: carpels 10-20, more or less beaked or apiculate, 1-seeded. (Callir-hoë: Greek mythological name.)

Plant annual: involucl absent.....1. *C. pedata*  
 Plant perennial: involucl present.....2. *C. involucrata*

1. *C. pedata*, Gray. Annual 1-3 ft. high; st. erect, leafy: radical and lower lvs. round-cordate, palmately or pedately 5-7-lobed or -parted, the lobes coarsely toothed or incised, upper lvs. 3-5-cleft or -parted, usually into narrow divisions: fls. spring and summer, red-purple, or cherry-red varying to lilac, somewhat racemose at summit of st., the peduncles longer than the lvs.; involucl absent; petals 1 in. or less long, with broad erose summit: carpels thick-beaked. S. U. S.

2. *C. involucrata*, Gray (*C. verticillata*, Groenl.). Perennial 9-12 in. high, hirsute or even hispid; sts. procumbent: lvs. rounded in outline, palmately or pedately 5-7-parted or deeply cleft, the divisions mostly cuneate and with oblong or lanceolate lobes: bractlets of involucl linear to oblong, half as long as the spreading calyx-lobes; fls. all summer, crimson-purple, cherry-red or paler, with broad erose-denticulate summit: carpels 18-25, beaked, often hairy. Minn. to Tex.—A var. is less hirsute, with smaller lvs. dissected into linear lobes and lilac or pinkish fls. Tex. and adjacent Mex.

3. **LAVATERA**, L. TREE MALLOW. About 25 species, mostly in the Medit. region but extending to the Canary Isls., Asia, Australia, and the isls. off S. and Lower Calif.; several grown in the flower-garden.—Herbs, shrubs, or trees, tomentose or hairy: lvs. angled or lobed, sometimes maple-like: fls. variously colored, rarely yellow, in terminal racemes or 1-4 in the axils, sometimes 2-4 in. across; fl.-bractlets 3-6 or 9, joined into an involucre; petals 5, reflexed after anthesis, emarginate or truncate, clawed; staminal column divided at summit into an indefinite number of filaments; ovaries few to many, united about an axis which is conical or umbrella-shaped at top and conspicuously surpasses the carpels; carpels beakless. (Lava-tera: one of the Lavater family of Zurich at the time of Tournefort.)

Plant annual, herbaceous.....1. *L. trimestris*  
 Plant biennial, woody at base.....2. *L. arborea*  
 Plant perennial, shrubby or even tree-like.  
 Fls. 1-4 in the axils, pedicelled.....3. *L. assurgentiflora*  
 Fls. solitary.  
 Petals reddish-purple; fls. sessile.....4. *L. Olbia*  
 Petals yellowish-white, striped and tipped with purple; fls.  
 stalked.....5. *L. insularis*

1. *L. trimestris*, L. (*L. rosea*, Medic.). Branching annual 3-6 ft. high: lvs. irregularly crenate-dentate, finely pubescent or nearly glabrous, the lower sub-rotund-cordate, the upper ones angled: fls. solitary, axillary, rose-pink or red, 4 in. across, blooming in summer and autumn, the pedicels mostly shorter than the subtending lvs.; receptacle or axis of the fr. expanded at apex into a disk, inclosing the ovary. Medit. region.—There is a white-fl. form.

2. *L. arborea*, L. Biennial with annual flowering branches, forming a tree-like shrub 3-10 ft. high or less: lvs. long-stalked, 3-9 in. long and as broad, with 5-9 unequally round-toothed lobes, softly downy on both sides, rarely nearly glabrous: fls. pale purple-red with dark purple veins at base, about 2 in. across, borne very abundantly in short leafy racemes or in axillary clusters; receptacle small, marked with little pits. Eu.—Cult. in the form of var. *variegata*, Hort., which has mottled lvs.

3. *L. assurgentiflora*, Kellogg. Shrub 6-15 ft. high, with simple sts., from seed reaching 6 ft. tall and blooming the first year: lvs. glabrous or finely stellate-pubescent, 3-6 in. broad, with 5-7 ovate-triangular lobes coarsely and irregularly toothed: fls. purple, 1-4 in the axils, on slender commonly recurved-ascending pedicels; bractlets of the involucl shorter than the calyx-lobes; petals 1-1½ in. long, with long narrow glabrous claws and a pair of dense hairy tufts at base: fr. strongly winged below, the axis low-conical. S. Calif. isls.

4. *L. Olbia*, L. Shrub 6 ft. high, branched from base: lvs. softly tomentose, the lowest 5-lobed, the upper 3-lobed with elongate middle lobe, the uppermost oblong, scarcely divided: fls. rather large, reddish-purple, solitary, sessile; petals 2-lobed. (*Olbia*: substantive place name used in apposition,—"habitat in *Olbia insula Galloprovinciæ*," according to Linnæus.) S. Eu.

5. *L. insularis*, Wats. Low bush, cinereous-puberulent: lvs. 7-lobed, the roundish-oval lobes very obtuse and obtusely dentate: pedicels shorter than the fls., at length deflexed; bractlets spatulate, almost distinct; petals emarginate,  $1\frac{1}{2}$  in. long, yellowish-white, tinged purplish, naked at base of claws: fr. of about 10 carpels, in an enlarged calyx. Coronado Isls., near S. Calif.

4. **ALTHÆA**, L. Tall leafy-stemmed herbs, grown in the open garden for their abundant showy fls.; about 15 species in temp. regions of the Old World.—Annual, biennial, or perennial, tomentose or pubescent: lvs. lobed or parted: fls. solitary or racemose, axillary, usually toward the summit of the st., with 6-9 bracts below the calyx; otherwise as in *Malva*. (*Althæa*: Greek to cure.)

Plant perennial: fls. 1 in. across.....1. *A. officinalis*

Plant biennial or essentially so: fls. much larger.

Lvs. wavy-angled or -lobed.....2. *A. rosea*

Lvs. deeply 7-lobed, toothed.....3. *A. ficifolia*

1. *A. officinalis*, L. MARSH MALLOW. Erect perennial 3-4 ft. high, downy: lvs. ovate or heart-shaped, 3-lobed or undivided, tomentose: fls. 1 in. across, bluish or rose, clustered in the lf.-axils. E. Eu. and occurring in this country as an escape in marshes near the coast.

2. *A. rosea*, Cav. HOLLYHOCK. Biennial to 9 ft.; st. strict and spire-like, hairy: lvs. large and rough, rugose, long-stalked, rounded-heart-shaped, 5-7-lobed or wavy-angled, crenate: fls. large and nearly sessile, in a long wand-like raceme or spike, in many forms and colors, produced in late summer. China.—Many double forms occur.

3. *A. ficifolia*, Cav. Biennial 3-6 ft.: lvs. reniform-cordate in outline, somewhat pedately lobed or divided into 7 narrow obtuse irregularly toothed parts: fls. large, showy, lemon-yellow or orange, single or double, in terminal spikes. Eu.; not common in cult.

5. **SIDALCEA**, Gray. Annuals or those in cult. perennials, useful for the herbaceous border; about 30 species, natives of W. N. Amer.—Spring or mostly summer-flowering herbs with palmately cleft or parted stipular lvs.: fls. often showy, pink, purple, or white, in terminal racemes or spikes, mostly without bracts or involuclers beneath, often polygamous by the abortion of the anthers, the female fls. being smaller; calyx 5-cleft or -parted; petals commonly emarginate or truncate; stamens united into groups in a double series: carpels 5-9, beakless or apiculate, reniform, separating at maturity. (*Sidalcea*: compound of *Sida* and *Alcea*, related genera.)

Fls. white with bluish anthers.....1. *S. candida*

Fls. usually colored, rarely white.

Sts. hispid or hirsute: petals about 1 in. long.....2. *S. malvæflora*

Sts. glabrous toward base: petals  $\frac{1}{8}$ - $\frac{1}{2}$  in. long.....3. *S. parviflora*

1. *S. candida*, Gray. Erect perennial from more or less creeping rootstocks, the sts. leafy, somewhat branched above, 2-3 ft. high, glabrous or nearly so: radical lvs. nearly orbicular, cordate, obtusely lobed or deeply crenate; st.-lvs. 5-7-parted, the divisions narrow and often toothed or cleft: fls. 1 in. or more across, white, in an erect spike-like raceme; petals  $\frac{1}{2}$  in. or more long. Rocky Mts.

2. *S. malvæflora*, Gray. CHECKERBLOOM. Sts. simple or nearly so, erect or ascending, 1-6 ft. high or more, sparingly hirsute: lvs. small, incised-crenate, upper ones 5-cleft or 5-divided, the segms. narrow and entire or broader and pinnately lobed: fls. rose-color, to 2 in. across when fully expanded, in simple loosely few-to many-fld. spiciform racemes; petals about 1 in. long. Calif.—Var. *Listeri*, Hort. (*S. Listeri*, Hort.), known also as "pink beauty" has satiny pink fls. It is of European origin. Another var. has large open purple fls.

3. *S. parviflora*, Greene. Sts. several, glabrous toward base, nearly simple, terminating in long loose racemes: lowest lvs. orbicular, crenate-toothed, the others deeply divided, with divisions lobed: pedicels subtended by simple linear bractlets scarcely their own length; fls. small, the petals  $\frac{1}{8}$ - $\frac{1}{2}$  in. long. S. Calif.



6. **MALVASTRUM**, Gray. FALSE MALLOW. Some 70–80 or more species in Amer. and S. Afr.; those grown in the flower-garden are perennials, blooming in hot weather.—Herbs or undershrubs of various habit, sometimes low and diffuse, sometimes tall: lvs. entire and cordate or lobed: fls. scarlet, orange, or yellow, short-peduncled or nearly sessile, axillary or in terminal spikes; calyx-like involucre wanting or of 2–3 bracts; calyx 5-cleft; petals emarginate or entire; styles 5 or more, stigmas capitate: carpels few to many, 1-ovuled, nearly or quite indehiscent and falling away from the axis at maturity. (Malvas-trum: name made from Malva.)

- Lvs. ovate-oblong: fls. 1–2 in the axils, pedunculate.....1. *M. capense*  
 Lvs. roundish or subcordate: fls. in sessile or short-peduncled spikes or  
 paniced clusters on nearly naked branches.....2. *M. Thurberi*

1. **M. capense**, Garcke (*Malva capensis*, L.). Shrubby and branchy, slightly viscid: lvs. ovate-oblong, somewhat 3-lobed and -angled, unequally toothed: fls. purple, 1–2 on axillary peduncles; involucre variable in size, the bracts lanceolate to ovate-lanceolate and shorter than the ciliate calyx-lobes: carpels glabrous. S. Afr.—There is a var. with yellow-variegated lvs. This species has been confused with *M. hypomadarum*, Sprague, which has fls. white with rose-purple eye and may be in cult.

2. **M. Thurberi**, Gray (*M. fasciculatum*, Greene). Sts. 3–15 ft. high, at base woody and often 1 in. or more thick, covered with short dense stellate pubescence: lvs. roundish, mostly subcordate, crenate, obscurely 3–5-lobed or some 3-cleft, 1–2 in. or more diam.: fls. in sessile or short-peduncled spikes or paniced clusters on nearly naked branches; calyx-lobes broad-ovate; petals rose-purple, about ½ in. long. (Named after Geo. Thurber, 1821–1890, American botanist and naturalist.) S. Calif. and Ariz.—Var. *laxiflorum*, Gray (*M. splendidum*, Kell.). Fls. rosy-pink, fragrant, rather loosely paniculate.

7. **SPHÆRALCEA**, St. Hil. (*Phymosia*, Desv., in part). GLOBE MALLOW. About 65 species, 4 or 5 of which are S. African, the remainder from warmer regions of N. and S. Amer.; a few grown in greenhouses or in the open in the S.—Shrubs, subshrubs, or herbs of various habit: herbage often covered with gray stellate pubescence: lvs. usually angled or lobed: fls. violet, flesh-colored, or red, solitary or in cymose clusters in the axils, or sometimes in terminal racemes or spikes; bracteoles 3, united at base or distinct; calyx 5-cleft; staminal column divided at top into many filaments; ovary many-celled; stigmas capitate: fr. subglobose, of many compressed 2-valved 2–3-seeded carpels united in a ring around a central axis from which they slowly separate. (Sphæral-cea: Greek for *globe* and *mallow*, the fr. commonly spherical.)

- Lvs. 5–7-lobed.....1. *S. umbellata*  
 Lvs. 3-lobed.  
 Fls. scarlet or rose.....2. *S. Munroana*  
 Fls. brick-red.....3. *S. cisplatina*

1. **S. umbellata**, Don (*S. vitifolia*, Benth. & Hook. *Malva umbellata*, Cav.). Erect branched shrub 3 ft. or more high, the sts., petioles and infl. densely stellate-tomentose: lvs. long-petioled, rotund-ovate, shortly somewhat 7-lobed, crenate-toothed, cordate, 3–5 in. long, more or less stellate-pubescent especially on the veins: peduncles axillary, usually 3-fld., rarely 2- or 5-fld.; calyx leathery, broad-campanulate, 5-lobed, the lobes semi-ovate; petals scarlet, white at base, obcordate; filaments forming a white column. Mex.—A var. is said to have reddish-purple fls. striped with white and rose.

2. **S. Munroana**, Spach. Perennial herb 1–2 ft. high, leafy to the top, minutely stellate-canescens: lvs. broad at base, obscurely 3-lobed, with broad blunt short lobes, crenate-toothed or sometimes incised: fls. scarlet or rose, 1 in. across, in axillary or terminal clusters; calyx ¼ in. long, not surpassing the depressed fr. (Named for Mr. Munro, gardener of the London Horticultural Society.) B. C. to Ida. and south.

3. **S. cisplatina**, St. Hil. (*S. miniata*, Spach. *Malva miniata*, Cav.). Tender branching subshrub 2–4 ft. high: lvs. 1–2 in. long, coarsely and unequally crenate,

deeply and sharply 3-lobed, the lobes narrow and acute, the midlobe over twice as long as the lateral: fls. brick-red, 1-1½ in. across, in axillary few-fl. cymose racemes. La Plata, whence it gets its name (*on this side the La Plata*).

**8. ABUTILON, Mill.** About 100 species of herbs and shrubs, in many warm countries, prized here for ornament.—Lvs. long-petioled, cordate at base, sometimes lobed, often maple-like whence the name "Flowering Maple": fls. solitary and axillary, drooping, lacking involucels, the calyx 5-cleft and sometimes brightly colored; petals obovate, in some species erect and forming a trumpet-shaped or bell-shaped corolla, white, yellow, reddish, and often handsomely veined; staminal column anther-bearing at apex: fr. aggregate, of several to many 2-valved often beaked carpels in a ring around a central axis. (*Abu-tilon*: of Arabic origin.)

Lvs. not lobed although sometimes angled, mostly cordate (see also No. 7).

Corolla and calyx long and narrow.....1. *A. megapotamicum*

Corolla wide-spreading.....2. *A. insigne*

Lvs. prominently lobed, usually vitis-like or grape-like, cordate or truncate at base.

Fls. blue (sometimes varying to whitish), very large.....3. *A. vitifolium*

Fls. with yellow or orange ground color, of smaller size (2 in. or less long or across).

Lobes of lvs. 3, the side ones often short and small.

Middle lobe broadest at base: fls. usually single.....4. *A. pictum*

Middle lobe narrowed at its base: fls. double.....5. *A. pleniflorum*

Lobes of lvs. 5-7, middle one narrowed at base.....6. *A. striatum*

Fls. of various colors, and lvs. either unlobed or more or less 3-lobed: mixed races.....7. *A. hybridum*

**1. *A. megapotamicum*, St. Hil. & Naud. (*A. vexillarium*, Morr.).** Attractive species of drooping habit, the young growth slender and glabrous or nearly so: lvs. lance-ovate to narrow arrow-shaped, 1½-3 in. long, not lobed but sometimes obscurely shouldered near base, long-acuminate, shallowly cordate, irregularly crenate-serrate and somewhat jagged, glabrous or puberulent beneath, stipules sometimes large: fls. single in the axils, 1½ to above 2 in. long, including the protruding brush of stamens, hanging and fuchsia-like; calyx red and cylindrical, half or more as long as the yellow petals. S. Amer.; "*megapotamicum*" means "big river," signifying the Rio Grande of S. Brazil; favorite conservatory plant; lvs. often mottled.

**2. *A. insigne*, Planch.** Young parts stellate-hairy: lvs. ovate-acuminate, 3-4 in. long, cordate, not lobed, crenate-dentate, hairy beneath: fls. large, 2-2½ in. across, hanging, wide open, whitish or rose with rich dark veins, very showy. Colombia.

**3. *A. vitifolium*, Presl.** Strong large hardy shrub with white-tomentose parts: lvs. orbicular-ovate and cordate in outline, 4-5 in. across, 3-5-7-lobed, the lobes long-pointed, soft-velvety beneath: fls. clustered, open, cup-shaped or broad bell-shaped, 2-3½ in. across, light blue (white fls. are known), veined, the anthers yellow; petals very broad and rounded. Chile.

**4. *A. pictum*, Walp.** Lvs. 3-lobed, green or variegated, glabrous or pubescent beneath and perhaps on veins above, the middle lobe usually shorter than the main or undivided part of the blade but sometimes equaling it, broadest at the base; margins serrate: fls. about 1¼ in. long, orange or yellow and veined crimson; calyx 1 in. long, brown-velvety-pubescent, the lobes little longer than the tube. S. Brazil, Uruguay, Argentina.

**5. *A. pleniflorum*, N. E. Br.** Much like No. 4 but lvs. green, glabrous on both surfaces, middle lobe nearly half as long again as undivided part of blade and slightly narrowed or cut in at its base: fls. double (as the name implies). Cultigen; probably to be included with No. 7.

**6. *A. striatum*, Dicks.** Lvs. green, glabrous above and essentially so beneath, 5-7-lobed, middle lobe twice or more as long as main or undivided part of blade and more than twice as long as broad and also more or less narrowed at its base: fls. 1¾ in. or less long, orange veined dark crimson; calyx thickly brown-pubescent. Guatemala.—Var. *Thompsoni*, Veitch. A race with not pubescent lvs. variegated and blotched with yellow; probably most of the stock under this name belongs with No. 7.

**7. *A. hybridum*, Voss.** The group of common conservatory and bedding abutilons that belong to none of the pure species, representing hybrids and perhaps

mutations: lvs. various, unlobed or shallowly 3-lobed or shouldered, green, speckled or blotched, the margins serrate to crenate-dentate, glabrous or pubescent: fls. pink, red, purple, yellow, white, open-bell-shaped or even more spreading, the prominent calyx mostly close-pubescent.—Here belong such garden vars. as Golden Fleece, Boule de Neige or Snowball, Fire Ball, Savitzii, Caprice.

9. **MALVAVISCUS**, Dill. (*Achania*, Sw.). About a dozen shrubs and stout herbs of trop. Amer., one of which reaches the U. S., some of them grown for ornament under glass and in the open far S.—Plant hispid or grayish-pubescent: lvs. cordate or subcordate, shallowly lobed or unlobed: fls. red and showy, on axillary peduncles, somewhat fuchsia-like as the petals do not spread but are held erect by an auricle toward the base; involucl of 7–12 narrow bracts; anthers exerted on the stipe-like column: fr. of fleshy carpels that are connate into a berry-like body, but that at length becomes dry and separate. (Malvavis-cus: *sticky mallow*, from the fr.)

- Plant an herbaceous perennial: involucl with manifestly spreading tips.....1. *M. Drummondii*  
 Plant a shrub: involucl with prevailingly erect bracts.  
 Fls. long, 2 in. and more (aside from projecting stamens): lvs. long-acuminate.....2. *M. grandiflorus*  
 Fls. shorter: lvs. short-pointed to nearly obtuse.  
 Lvs. soft, tomentose or thick-pubescent beneath.....3. *M. mollis*  
 Lvs. harsh, with stellate hairs only on veins beneath.....4. *M. arboreus*

1. **M. Drummondii**, Torr. & Gray. Strong perennial to 6 ft., forming clumps; young parts pubescent with forked and stellate hairs as are the lvs. more or less on both surfaces: lvs. broad-cordate or orbicular-cordate, 3–4 in. across, usually shouldered or indistinctly 3-lobed, crenate-dentate: fls. about 1 in. long without the projecting stamens and style; involucl mostly shorter than calyx, the bracts with somewhat broadened spreading tips; corolla vermilion-red: fr. red and berry-like, edible (whence the name "May apple"), the carpels finally separating. (Thos. Drummond, British collector in N. Amer., died in Havana 1835.) Cuba and Fla. to Tex. and N. Mex.; frequently planted S.

2. **M. grandiflorus**, HBK. Shrub, nearly glabrous; shoots bearing loose simple hairs: lvs. ovate to ovate-oblong, long-acuminate, obtusely dentate, glabrous or with few hairs on veins beneath, those on flowering shoots 3–4 in. long by mostly about ½ in. broad and often ovate-lanceolate, those on verdurous shoots 6–8 in. long and 4–5 in. broad, often shouldered or indistinctly 3-lobed and prominently 3–5-ribbed: fls. red, long and expanding upward, 2–2½ in. long, the showy corolla three to five times exceeding the calyx; involucl of spatulate erect bracts nearly or quite equaling the calyx. Mex.; cult. S. within our borders.

3. **M. mollis**, DC. Low shrub with grayish-pubescent-tomentose parts, the under side of lvs. felty-tomentose with forked and stellate hairs: lvs. soft to the touch, broad-ovate to nearly orbicular-ovate, 2½–4½ in. across, short-pointed, mostly narrowly cordate, often shouldered or angled above, margins crenate-serrate to nearly entire: fls. 1½ in. or less long, scarlet, with rather loose but usually not spreading-tipped very narrow bracts about equaling the calyx. Mex. to Colombia; planted on our southern borders and frequent in greenhouses, usually named *M. arboreus*; the most common cult. malvaviscus.

4. **M. arboreus**, Cav. Distinguished by mostly smaller lvs. than those of No. 3 and which are rather harsh to the touch, prominently angle-toothed, often distinctly shallowly lobed, with forked and stellate hairs above and also on the ribs and veins beneath but not velvety: fls. smaller, about 1 in. long. Trop. Amer. and variable; infrequent in cult.

10. **PAVONIA**, Cav. Herbs or shrubs, sometimes grown under glass; species about 100, Cent. Amer. to Argentina, also in trop. Afr. and Asia to Australia and the Pacific.—Habit various: herbage stellate-tomentose, hispid or glabrescent: lvs. often angled or lobed: fls. of various colors, solitary or in axillary cymose clusters; involucl consisting of a whorl of 5–many narrow bractlets distinct or more or less connate and calyx-like, usually not clustered; calyx 5-cut or 5-toothed; petals spreading or convolute-connivent; staminal column truncate or 5-dentate; stigmas capitate: carpels 5, 1-ovuled, unarmed

or 1-3-awned. (Pavonia: J. Pavon, joint author of Ruiz and Pavon's "Floræ Peruviana et Chilensis"; died 1844.)

- Fls. yellow; staminal column equaling the petals (1 in. long) ..... 1. *P. spinifex*  
 Fls. red or purple.  
 Corolla 1-1½ in. long; staminal column elongate, exserted ..... 2. *P. multiflora*  
 Corolla ¾ in. long; staminal column short ..... 3. *P. hastata*

1. *P. spinifex*, Willd. Shrub to 20 ft., with slender st. and few wand-like branches: lvs. ovate, acuminate, subcordate, doubly toothed or crenate, sometimes angled, pubescent on both surfaces: fls. yellow, 1 in. across, not fragrant, on axillary 1-fl. pedicels; bracteoles 5 or more, linear, somewhat hairy; calyx-lobes lanceolate or ovate; corolla open, 1 in. long, the petals obovate, equaled by the staminal column: caps. with 3 spines. (Spinifex: Latin *spiny-fruited*.) S. Amer.

2. *P. multiflora*, St. Hil. Robust, with stout usually simple st.: lvs. narrowly oblong- or obovate-lanceolate, long-acuminate, serrate or denticulate, 6-10 in. long: fls. in a short terminal corymb; bractlets beneath the fl. numerous, conspicuous, narrow-linear, whorled, red-hairy, curving, about as long as the narrow rolled purple corolla (1-1½ in. long); calyx-segms. much shorter than the bractlets; staminal column 2½ in. long, prominently exserted, with hanging bluish anthers. Brazil.

3. *P. hastata*, Cav. Shrubby, much branched, minutely grayish-pubescent: lvs. hastate, obtusely dentate, 1-2 in. long: fls. slender-peduncled, axillary; bractlets of involucre 5-6, obovate to lanceolate, about equaling the calyx; fls. often cleistogamous; petals ½-¾ in. long, pale red with dark maroon spot at base; staminal column short: carpels reticulated, unarmed. S. Amer., naturalized in S. U. S. —Cult. in Calif.

11. **MALOPE**, L. About a dozen described herbaceous species, probably reducible to 3, in the Medit. region, one planted in the flower-garden.—Annual, glabrous or pilose: lvs. entire or lobed: fls. violet, pink, or white, large, often showy, solitary, axillary, stalked, subtended by 3 large cordate distinct bracts; calyx 5-parted: carpels numerous, 1-seeded, congested into a head, indehiscent. (Malope: name anciently used for some kind of mallow.)

*M. trifida*, Cav. Height 2-3 ft.: lvs. 3-nerved, 3-lobed, dentate, glabrous, the lobes acuminate: peduncles axillary, 1-fl.; fls. rose and purple, with usually darker center, 2-3 in. across, blooming most of summer. Spain, N. Afr.—Var. *grandiflora*, Paxt. (*M. grandiflora*, Dietr.), has large deep rose-red fls. veined darker inside. There are vars. with white and rose-colored fls.

12. **THESPESIA**, Corr. Trees or tall herbs, suitable for greenhouse cult. or in the open in warm regions; about 10 species in trop. Afr., Asia, and the isls. of the Pacific; also 1 from Porto Rico; distinguished from *Hibiscus* by the confluent stigmas, more woody caps., and obovoid compressed seeds.—Lvs. entire or angulate-lobed: fls. usually yellow, showy; bracts 3-5, small or deciduous; calyx truncate, minutely or bristle-toothed, rarely 5-cleft; ovary 5-celled, the cells with few ovules: caps. woody-coriaceous, loculicidally 5-valved or commonly indehiscent. (Thespesia: Greek *divine*; application doubtful.)

- Fls. yellow, 2-3 in. across ..... 1. *T. populnea*  
 Fls. purple or red, 4-6 in. across ..... 2. *T. grandiflora*

1. *T. populnea*, Soland. Small tree 30-40 or even 50 ft. high, with dense top; parts covered with peltate scales: lvs. long-petioled, ovate, cordate, acuminate, 4 in. long: fls. axillary, 2-3 in. across, varying from yellow to purple, blooming all the year in the tropics. Trop. Asia, Afr., and the isls. of the Pacific.

2. *T. grandiflora*, DC. Tree 30-45 ft. high: lvs. ovate, subcordate, acuminate, 6-8 in. long: fls. purple or red, 4-6 in. diam. Porto Rico.

13. **GOSSYPIUM**, L. COTTON. The latest monographer of the genus accepts 29 species and many botanical vars., widely spread in trop. regions, several species cult. for the long hair on the seeds employed as fiber.—Stout annual or perennial shrubs, sometimes tree-like, with large palmately-ribbed



or -lobed lvs., the parts often more or less glandular-dotted and also variously punctate; large glands on the under surface of lvs. and on involucels and peduncles often secrete freely: fls. axillary, bisexual, large, white, yellow, or purplish that often change color after opening; involucl of 3 or 5-7 large united or separate bracts that are usually more or less cut or fringed, giving character to the prominent bud or "square"; calyx entire or somewhat 5-lobed; petals large and broad, convolute; ovary single, superior, 3-4- or 5-celled, the ovules 2-7 or more in each cell: fr. a dehiscing caps. or "boll," from which the abundant cotton emerges in the fiber-producing species, comprising 3-5 cells or "locks"; seeds nearly globular, in most species bearing a close wool or fuzz in addition to the fleece, lint, or floss that is removable and forms the cotton of commerce; whether the seed is smooth or fuzzy (aside from the lint) is an important diagnostic character. (Gossypium: an ancient name of the cotton plant.)—A few gossypiums have been grown for ornament, but they are little known in that capacity. The cotton-producing species are much modified by long domestication and hybridizing, and the original specific types are often difficult to make out. While the cottons of the U. S. are mostly of two species (Nos. 1 and 2), other specific stocks have probably entered into them or are likely to be grown experimentally; the most important of these several species are entered here. The nativities are more or less conjectural.

- Seeds essentially naked (without close fuzz or wool), cleaning freely:  
bracts of involucl distinct or nearly so, and glands conspicuous:  
occidental.....1. *G. barbadense*  
Seeds with close short persistent fuzz or wool.  
Bracts of involucl distinct.—Occidental cottons.  
Lvs. prevailing divided one-half or more their depth.  
Caps. usually 4-celled; fuzz greenish when fresh (except in the  
var.).....2. *G. hirsutum*  
Caps. usually 3-celled; fuzz mostly gray or brownish.  
Teeth of involucl-bracts ciliate.....3. *G. punctatum*  
Teeth bare or essentially so.....4. *G. peruvianum*  
Lvs. very broad and lobed scarcely more than one-third their  
depth.....5. *G. mexicanum*  
Bracts of involucl united, sometimes only at base.—Oriental cottons.  
Lvs. divided two-thirds or more their depth into 3, 5, or 7 curvilinear  
bristle-tipped lobes; gland on only the central vein.....6. *G. arboreum*  
Lvs. cut about half their depth into mostly 3 sometimes 5 acute or  
acuminate lobes; glands often present on all 3 veins.....7. *G. indicum*  
Lvs. with 5 (rarely 3 or 7) obtuse or acute lobes extending to less  
than half the depth of the blade; gland on only central vein.  
Lobes of lvs. acute or acuminate.....8. *G. herbaceum*  
Lobes rounded or very obtuse or emarginate.....9. *G. obtusifolium*

1. *G. barbadense*, L. SEA-ISLAND COTTON. Shrubby, glabrous except on petioles and veins on under surface of mature lvs., the sts. dark-colored and more or less angled, becoming woody and the plant attaining 5-8 ft. and more: lvs. as broad as long (sometimes broader), with 3 or 5 long-acuminate lobes extending half or more the depth of the blade, the lateral ones usually spreading and the central one not much if any longer, the lf.-base cordate or subcordate; peduncle usually shorter than petiole: fls. bright yellow with purplish tinge, short-tubed, commonly about twice length of involucl; calyx with large rounded teeth; bracts of involucl 5 or more, coarsely but not very deeply cut, distinct or only slightly united at base: fr. 3- or sometimes 4-valved or -celled and sharp-pointed; seeds ovate and beaked, about  $\frac{1}{2}$  in. long, nearly or quite naked; lint very fine and long, from  $1\frac{1}{2}$ -2 in. (Barbadense: citizen of Barbados, W. Indies.) Trop. Amer., and now wide-spread, yielding a very long-staple cotton in both the U. S. and Egypt; sometimes called "tree cotton," although other species equally merit that designation.—*G. vitifolium*, Lam., yielding some of the Egyptian long-staples and also some of the trop. American races, is scarcely botanically distinct: lvs. hairy beneath, lobes more ascending and the middle one mostly much longer than the others: fls. often three times as long as involucl: fr. 3-5-celled, the seeds distinct. Trop. Amer. *G. brasiliense*, Macf., yielding certain trop. American cottons, is a large-leaved and large-fl. species or race: lvs. glabrous, strongly cordate, central of the 5 acuminate lobes longest: involucl large, twice exceeded by the corolla: fr. 3-celled, the seeds more or less united. Trop. Amer.

2. *G. hirsutum*, L. UPLAND COTTON of the U. S. of which there are short-staple and long-staple races, the latter perhaps hybrids with No. 1: mostly annual, much-branched, with greenish-red hirsute or pubescent growth, 2-4 or 5 ft. tall: lvs. usually as broad as long and often broader, 3-6 in. across, 3-lobed of which the middle one is about one-half the depth of the blade, the lobes broad at base but abruptly acuminate-pointed, cordate or subcordate-truncate, more or less hirsute and as if dust-coated: fls. white or light yellow turning pink or purple, usually less than twice the length of the deeply lobed bracts: fr. larger than in No. 1, less tapering,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, with usually 4 cells or locks; seeds larger, densely covered with a persistent fuzz which is greenish when fresh; lint about  $\frac{3}{4}$ - $1\frac{1}{8}$  in. long in short-staple and  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. long in the long-staples. Probably trop. Amer.; in common cult. probably much hybridized.—Var. *religiosum*, Watt (*G. religiosum*, Roxb.), has slender, trailing or climbing rather than erect shoots, lvs. pilose-tomentose, bractlets deeply cut, and fuzz rust-colored as well as sometimes the lint.

3. *G. punctatum*, Schum. & Thonn. JAMAICA COTTON. Woody plant, with villous and usually prominently punctate lvs.: bracts of involucre with finfriate teeth or lobes: fr. mostly 3-celled, prominently beaked; seeds large and distinct, with gray or rusty fuzz. East coasts of trop. Amer. and west coasts of Afr., where it is more or less cult. as also by the Indians of Ariz., but in Amer. known mostly as a wild or weedy plant.

4. *G. peruvianum*, Cav. PERUVIAN COTTON. Lvs. large, at first tomentose beneath, the oblong mucronate lobes extending half or three-fourths the depth of the blade: fls. very large, once and a half longer than involucre; bracts without ciliate teeth or lobes: fr. 3-celled; seeds large and distinct, with a more or less copious gray or rusty, sometimes greenish, fuzz. Cent. and S. Amer. and cult. in those countries, as well as in Egypt and elsewhere.

5. *G. mexicanum*, Todaro. MEXICAN COTTON. Shrubby species with nearly or quite glabrous mature lvs., broad-ovate or nearly orbicular and mostly broader than long, 3-6 in. across, with 3 or 5 broadly ovate-triangular short-acute lobes that do not extend more than one-third the depth of the blade: fls. small, on short pedicels, pale yellow or white tinged pink and sometimes blotched in center, scarcely exceeding the lobes of involucre: fr. ovoid-oblong and acuminate, 4- but mostly 5-valved; seeds with gray fuzz and dull white or reddish lint. Mex. and probably elsewhere in trop. Amer., and probably entering into some of the cult. cottons of the U. S.

6. *G. arboreum*, L. TREE COTTON of India, cult. in many races and botanical vars. in Asia and Afr.: 6-10 ft., with long slender trailing branches, the growing parts deep glossy-purple: lvs. coriaceous, 3-7-lobed two-thirds or more the depth of the blade, sometimes almost pedate, the narrow lobes bristle-tipped: infl. much elongated; fls. deep purple-red with darker center and hairy folds, nearly three times as long as the entire or few-toothed bracts: fr. roundish and acuminate, mostly 3-celled; seeds ovoid, with adhering fuzz. Native in Old World.

7. *G. indicum*, Lam. (*G. Nanking*, Meyen). CHINESE or INDIAN COTTON. Annual or perennial, stature not large, young parts prominently appressed stellate-hairy: lvs. as broad as long or even broader, 3-lobed to about half their depth and with an extra short lobe on either side, the lobes acute or acuminate, base subcordate to nearly truncate: fls. mostly solitary and axillary, yellow with faint blotches, about twice the length of the cordate-auriculate mostly 3-toothed bracts: fr. ovoid-acuminate and somewhat angled, with 3 or 4 cells; seeds with dense reddish fuzz, the lint white, reddish or tan. Probably E. Asia.

8. *G. herbaceum*, L. LEVANT COTTON. Herbaceous annual, sparsely hairy or becoming glabrous: lvs. coriaceous and reticulate, strongly cordate, the 5-7 lobes extending less than half the depth of the blade, broad-ovate, short-acute, mostly narrowed at base: fls. medium in size, yellow with purple center, about once longer than the broad-ovate obtuse deeply cordate bracts that are cut into 7-9 lobes: fr. 4-5-celled; seeds large, angled, with gray fuzz and grayish lint. Probably native in Arabia and Asia Minor; supposed to enter into some of the short-staple cottons of the U. S.

9. *G. obtusifolium*, Roxb. CEYLON or ORIENTAL COTTON. Slender-stemmed branchy shrub, young parts stellate-hairy, distinguished by the 3-5 obtuse (or sometimes emarginate) but minutely bristly-tipped lobes of the thin smooth rather small lvs.: fls. bright yellow with dark purple center, much exceeding the somewhat cordate ovate-acute entire or toothed bracts: fr. small, abruptly acuminate, 3-celled; seeds very large, with dense gray or reddish fuzz and reddish-white lint. Ceylon; in some of its forms cult. in Asia and Afr.

14. **INGENHOUSIA**, Moc. & Sessé. One or 2 Mexican shrubs or subshrubs differing from *Gossypium* in the narrow not cordate and entire bracts of the involucl, entire truncate calyx and absence of lint or cotton on the seeds. (*Ingenhouzia*: Jean Ingen-Housz, 1730-1799, of Holland, one of the founders of plant physiology.)

**I. triloba**, Moc. & Sessé. Nearly or quite glabrous perennial 4-10 ft., with purplish punctate-dotted branches: lvs. parted nearly to the base into 3 or 5 lance-acuminate entire lobes, or the upper ones entire or mitten-shaped, punctate, often puberulent on the margins: fls. axillary or somewhat clustered, about 1 in. long, white turning pink, finely dotted, twice or more surpassing the ovate-lanceolate sharp bracts: fr.  $\frac{1}{2}$  in. long, puberulent. S. Ariz., Mex.; sometimes planted for ornament in Calif.

15. **LAGUNARIA**, Don. Species considered to be only 1, from Australia and S. Pacific Isls., planted for ornament in Calif.—*Hibiscus*-like, but differing in the radiating capitate stigma, usually 3 deciduous bracts in the involucre and the scurfy indumentum. (*Laguna-ria*: from its resemblance to *Lagunæa*, now merged in *Hibiscus*, which commemorates Andres de Laguna, Spanish botanist who died in 1560.)

**L. Patersonii**, Don. Attractive tree to 50 ft.: lvs. simple and entire, thick and margins somewhat revolute, ovate to oblong, 2-4 in. long, obtuse, rounded or subcuneate at base, gray-scurfy beneath: fls. solitary in axils on very stout pedicels,  $2\frac{1}{2}$  in. across, pale rose, the column of stamens not equaling the oblong-ovobate scurfy petals; calyx with short triangular teeth: caps. splitting into 5 parts disclosing the bright brown kidney-shaped seeds about  $\frac{1}{4}$  in. long. Seeds long ago sent to England from Norfolk Isl. by Colonel Paterson.

16. **HIBISCUS**, L. ROSE MALLOW. If defined broadly, as here intended, the genus has perhaps 200 species; they are herbs, shrubs, and trees, native in trop. and temp. regions around the world, a few yielding food and fiber products but in this country grown mostly for ornament.—Lvs. palmately veined, lobed or parted: fls. bisexual, 5-merous, mostly bell-shaped, axillary and paniculate, often very large, scarlet, pink, white, yellow; involucl of few to several broad or narrow bractlets; calyx 5-toothed or -parted; staminal column anther-bearing below the truncate or 5-toothed apex; style-branches 5, slender and spreading or becoming so: fr. a dry more or less dehiscent 5-valved caps. (*Hibiscus*: ancient Greek and Latin name for marsh mallow.)

- A. Plant a low diffuse spreading hairy annual. (**TRIONUM**)..... 1. *H. Trionum*
- AA. Plant strong and erect.
  - B. Species of annuals and herbaceous perennials.
    - C. Calyx large and spathe-like, splitting down one side, usually early deciduous. (**ABELMOSCHUS**)
      - D. Bractlets of involucl linear.
        - E. Pod 3 in. or less long..... 2. *H. Abelmoschus*
        - EE. Pod 4-5 in. or more long..... 3. *H. esculentus*
      - DD. Bractlets ovate to oblong..... 4. *H. Manihot*
    - CC. Calyx regularly 5-lobed or -cleft, not spathe-like.
      - D. Involucl and calyx red, thick and fleshy, edible..... 5. *H. Sabdariffa*
    - DD. Involucl and calyx not so.
      - E. Sts. not prickly.
        - F. Foliage nearly or quite glabrous.
          - G. Lvs. divided into narrow divisions..... 6. *H. coccineus*
          - GG. Lvs. hastate with short lobe on either side at base, or not lobed..... 7. *H. militaris*
        - FF. Foliage prominently pubescent or tomentose, at least underneath.
          - G. Lobes of calyx usually abruptly pointed: fls. rose..... 8. *H. Moscheutos*
          - GG. Lobes long-acuminate: fls. white with rose center..... 9. *H. oculiroseus*
      - EE. Sts. prickly..... 10. *H. cannabinus*
    - BB. Species of shrubs and small trees.
      - C. Involucl of separate bractlets.
        - D. Fls. yellow..... 11. *H. calycinus*
        - DD. Fls. white, pink, red.
          - E. Lvs. linear or lanceolate, or parted into lobes of such shape... 12. *H. heterophyllus*
          - EE. Lvs. broad.

- f. Petals deeply cut and fringed.....13. *H. schizopetalus*  
 ff. Petals not lobed or only shallowly emarginate.  
 g. Margins of lvs. entire.....14. *H. Arnottianus*  
 gg. Margins dentate or lobed, or both.  
 h. Staminal column long-exserted.....15. *H. Rosa-sinensis*  
 hh. Staminal column not surpassing the corolla.  
 i. With pubescent lvs.....16. *H. mutabilis*  
 ii. With glabrous lvs.....17. *H. syriacus*  
 cc. Involucel an 8-10-toothed cup: fls. yellow. (PARITIUM, PARITI.)  
 d. With deciduous involucel and calyx.....18. *H. elatus*  
 dd. With persistent involucel and calyx.....19. *H. tiliaceus*

1. *H. Trionum*, L. (*H. africanus*, Hort.). FLOWER-OF-AN-HOUR. Depressed branching hairy annual 1-2 ft. high, some of the branches becoming prostrate, sometimes grown in the flower-garden for the solitary sulfur-yellow or white dark-centered fls. 2-3 in. across that close in shadow: lvs. 3-lobed or most of them 3-5-parted, middle one much the largest, all coarsely toothed: pedicel elongating in fr., the setose papery dark-striped calyx becoming inflated, bractlets linear. Cent. Afr.; variable; now a weed in this country; the name *Trionum* is derived from the 3-lobed lvs.

2. *H. Abelmoschus*, L. (*Abelmoschus moschatus*, Moench). Hispid annual or biennial, 2-6 ft., grown in warm countries for the musk-fragrant seeds and the showy yellow crimson-centered axillary fls. which are about 4 in. across: lvs. various, usually with deep divaricate narrow strongly and irregularly toothed lobes, but some of them shallowly lobed and maple-like, all sparsely hairy on both surfaces: bractlets linear, much shorter than the spatheaceous many-toothed caducous calyx: fr. oblong-acuminate, hairy, 3 in. or less long. India; *Abelmoschus* refers to the musky seeds, part at least of the word being Arabic.

3. *H. esculentus*, L. (*Abelmoschus esculentus*, Moench). OKRA. GUMBO. Stout nearly glabrous annual 1½-6 ft. and more, grown as a garden vegetable for the soft immature edible pods: lvs. large, often 12 in. and more across, cordate-ovate or broader in outline, variously 3-9-lobed or -divided, lobes either narrow or broad, margins coarsely toothed: bracts subulate, ½-1 in. long, falling from the fr.: fls. solitary and axillary, yellow with a reddish center, 2-3 in. long: fr. a long ribbed beaked light-hairy or nearly glabrous pod with valves becoming revolute, 4-12 in. long and woody at maturity. Old World tropics.

4. *H. Manihot*, L. (*Abelmoschus Manihot*, Medic.). Tall rather coarse annual or perennial, 3-9 ft., sparsely setose, grown often as an annual for its showy pale yellow or whitish fls. 4-9 in. across with a dark brown center, clustered at the ends of branches: lvs. large, ovate to nearly orbicular in outline, 6-12 in. or more across, palmately divided into 5-9 long narrow lobes of variable widths and dentation, petioles long: bractlets ovate to narrow-oblong, shorter than the spatheaceous nearly entire calyx: fr. oblong, hispid, 2-3 in. long. E. Asia; the name *Manihot* probably suggests the resemblance of the lvs. to those of the cassavas or manihots (see page 457).

5. *H. Sabdariffa*, L. ROSELLE. Strong annual, 5-7 ft., making a broad clump with branches from the base, the sts. reddish and nearly or quite glabrous, grown far S. and in the tropics for the edible acid fleshy calices and involucl taken before they or the pods develop woody matter: root-lvs. ovate and undivided; st.-lvs. 3-4 in. across, 3-lobed or -parted and the side lobes sometimes again lobed, the lobes 1 in. or more broad and crenate-serrate or -dentate: fls. axillary, solitary and nearly sessile; corolla yellow, twice as long as thick red calyx and involucl. Old World tropics; *Sabdariffa* is a Turkish name.

6. *H. coccineus*, Walt. Glaucous and glabrous perennial herb 3-10 ft. high, grown for its large rose-red or crimson fls. in the upper axils 5-6 in. across: lvs. digitately or somewhat pedately 3-5-parted, the divisions slender, acuminate, remotely toothed: bractlets very narrow, almost setaceous, 1 in. long more or less, shorter than the large ovate-lanceolate pointed calyx-lobes; petals obovate and much narrowed toward base so that they stand well apart; column very long: fr. about 1 in. long, acute. Swamps Ga. and Fla.

7. *H. militaris*, Cav. Nearly or quite glabrous somewhat glaucous herbaceous perennial, 4-6 ft., sometimes planted for its white, bluish, or pink purple-centered fls. 3-5 in. across, borne along the st. in the axils: lvs. hastate, with 2 short lobes at base and oblong-lanceolate or triangular-lanceolate long-acuminate serrate middle lobe 2-5 in. long; upper lvs. less lobed: bractlets linear, ¾ in. or less long, much shorter than the large triangular-pointed calyx-lobes: fr. 1 in. long more or less, inclosed in calyx. Minn. to Fla. and La.; the spear-shaped lvs. give the plant a military (*militaris*) look.



8. *H. Moscheutos*, L. Mostly pubescent or soft-tomentose on young growths, 3-8 ft., the most popular of the herbaceous perennial rose mallows: lvs. ovate, 3-7 in. long, sometimes shouldered, rarely short-lobed, acuminate, crenate-dentate, white-tomentose beneath, mostly becoming glabrous above: bractlets linear, usually somewhat shorter than the ovate-acute tomentose calyx-lobes: fls. 4-8 in. across, bright pink or rose or sometimes whitish, without a dark center: fr. glabrous, ovoid, about 1 in. long, blunt or short-pointed. (*Moscheutos* is an ancient name adopted by Linneus; the herbalists thought this plant to be the *Rosa Moscheutos* of Pliny.) In swamps Mass. west to Mo. and south to Fla., but mostly in brackish places along the coast.—The great-fl. garden mallows are forms or derivatives of this species.

9. *H. oculiroseus*, Britt. Probably a race of No. 8, differing principally in having a white corolla with dark rose or crimson eye (as the name indicates): calyx-lobes triangular-lanceolate: fr. ovoid-conic, long-pointed. Salt marshes N. Y. and N. J.

10. *H. cannabinus*, L. Annual or perennial, mostly with glabrous but prickly sts., a source of fiber in Asia, more or less mentioned in this country: lower lvs. cordate and not lobed, the upper ones deeply digitately lobed into narrow serrate lobes or divisions: fls. large, yellow with crimson center, axillary; sepals lanceolate and bristly; bractlets narrow: fr. nearly spherical and bristly. Old World tropics.

11. *H. calycinus*, Willd. (*H. chrysantha*, Hort.). Pubescent small slender shrub, grown in Calif. for the lemon-yellow dark-centered axillary fls. 2-3 in. across: lvs. round-cordate, strongly 5-7-nerved, angled or shouldered, about 3-4 in. across, crenate, somewhat hairy: bractlets 5, ovate and awl-pointed, about equaling the ovate-acute calyx-lobes: fr. tomentose. S. Afr.

12. *H. heterophyllus*, Vent. Tall shrub with frequently prickly branches, pubescent in infl. and on young growth, hairy on petals and stellate-tomentose on calyx, otherwise mostly glabrous, grown in S. Calif. for the white fls. 3-4 in. long with crimson or purple eye: lvs. variable, from simple to deeply parted, the simple ones and the lobes linear to long-lanceolate (lobes strongly ascending with narrow sinuses), more or less serrulate, light colored and perhaps scattered-hairy beneath: bractlets very narrow, shorter than broad long-tapering calyx-lobes: fr. hairy. Australia.

13. *H. schizopetalus*, Hook. f. Large glabrous distinct shrub with many slender drooping branches, planted in warm countries for the red or orange-red fls. 2-3 in. across that have handsomely multisect recurved petals and that hang on very long jointed peduncles: lvs. ovate-elliptic, 2-3 in. long, acute or acuminate, dentate: calyx tubular, with short broad teeth; column long-exserted: fr. long. E. trop. Afr.

14. *H. Arnottianus*, Gray. A large shrub and sometimes a small tree native in Hawaii and to be expected under cult. in Calif. for its solitary axillary pure white fls., or white with pinkish veins, the petals 3-4 in. and more long: lvs. ovate, 4-5 in. long, entire, rather thick or stiff: bractlets 5-7, triangular or lanceolate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, much shorter than the tubular shortly 5-toothed calyx; column long-exserted, the anthers on long spreading filaments: fr. as long as the calyx. (Dedicated to George A. W. Arnott, 1799-1868, Scotch botanist, who collaborated with Sir W. J. Hooker.)—A related plant is *H. Denisoni*, Burb., introduced into England from Australia but of undetermined origin: it has leathery entire ovate lvs. and white fls., but the calyx is deeply cleft into lance-pointed divisions, the bractlets are much longer, and the column is little projecting and without slender filaments.

15. *H. Rosa-sinensis*, L. ROSE-OF-CHINA (as the name means). CHINESE HIBISCUS. Becoming a large shrub or even tree-like and 25-30 ft. high, nearly glabrous, grown abundantly in subtrop. and trop. countries for its profuse large very showy fls. and in glasshouses for the summer bloom: lvs. broad-ovate to narrow-ovate, 3-4 $\frac{1}{2}$  in. long, abruptly pointed or acuminate, not lobed, the margins variously toothed, notched, or almost entire except near apex, glabrous or with few scattered hairs on veins beneath: fls. in upper axils on short or long jointed spreading or declined peduncles; bractlets linear, separate and more or less loose, shorter than the ovate- or lance-pointed lobes of the half-cut calyx; corolla 4-6 in. across with flaring limb, rose-red but now varying into white, buff, and many other shades, sometimes double; column conspicuously exserted: fr. ovoid, beaked. Asia, probably China, but now conspicuous in all warm countries and grown under many varietal and Latin names.—Apparently hybridizes with No. 13, the forms being recognized by drooping long-peduncled fls. with more or less crisped corollas and short-toothed calyx. Some forms bear nearly entire lvs. and erect fls., perhaps

hybrids. Var. *Cooperi*, Nichols. (*H. Cooperi*, Hort.), is a state with narrow more or less irregular lvs. splashed and blotched with white and crimson; fls. small, scarlet, usually distorted or imperfect; grown under glass for the foliage.

16. *H. mutabilis*, L. Pubescent to tomentose large shrub or tree-like, frequently planted in trop. and subtrop. regions for the fls. 3-4 in. across that open white or pink but change to deep red at night: lvs. large, broad-ovate to nearly round-ovate in outline, 4-8 in. across, 3-5-lobed to one-half or less depth of the blade, lobes triangular-acute or acuminate, cordate at base, shallowly crenate-dentate, lightly hairy above but pubescent or tawny-tomentose beneath: fls. axillary and clustered at tips, the corolla hairy outside, the broad-ovate calyx-lobes and very narrow bracts tomentose: fr. globose, about 1 in. long, hairy. China; in the S. U. S. sometimes called Confederate Rose and Cotton Rose.

17. *H. syriacus*, L. ROSE-OF-SHARON. SHRUBBY ALTHEA of gardens. Nearly or quite glabrous erect-growing shrub, sometimes almost tree-form, to 10-12 ft., hardy in the northern states and much grown for its summer and autumn bloom of open-bell-shaped rose or purple axillary short-peduncled fls. 2-3 in. across that vary to cream-color, white, bluish, and otherwise, often double: lvs. rather small, triangular-ovate or rhombic, 2-3 in. long, strongly 3-ribbed, most of the lower ones 3-lobed (or with 2 side lobes), the margins variously toothed and notched: bractlets linear, about the length of the triangular rather short calyx-lobes: fr. oblong-ovoid, about 1 in. long, abruptly short-beaked. E. Asia; cult. under many varietal names; there are races with variegated lvs.

18. *H. elatus*, Sw. (*Paritum elatum*, Sw.). MOUNTAIN MAHOE. CUBAN BAST. Small tree, grown on our southern borders for ornament; young growths pubescent: lvs. large and heavy, broadly cordate-ovate, 5-9 in. across, strongly many-ribbed, abruptly pointed, entire, gray-felted beneath: involucre tubular, 8-10-toothed, deciduous with the much larger deeply lobed calyx; corolla 4-5 in. and more across, opening yellow in morning and changing to orange and red: fr. oblong-ovoid and villous; seeds hairy. W. Indies.

19. *H. tiliaceus*, L. (*Paritum tiliaceum*, Juss.). Shrub or tree, also somewhat planted in our warmer parts: lvs. nearly orbicular, 3-8 in. across, abruptly acuminate, cordate, entire or obscurely crenate, very veiny and somewhat hairy or pubescent beneath: involucre and calyx persistent, the former tubular and deeply about 10-cleft; petals 2-3 in. long, yellow: fr. ovoid and tomentose; seeds nearly or quite glabrous. Tropics, probably of Old World nativity.

### 103. BOMBACACEÆ. BOMBAX FAMILY

About 20 genera and 150 species of trees in the tropics around the world.—Lvs. entire or digitate, the stipules deciduous: fls. bisexual, solitary or paniced, regular; calyx mostly 5-toothed, valvate; petals 5, sometimes adnate at base to stamen-tube; stamens 5 to many, separate or monadelphous, with long filaments and short anthers, the pollen smooth; ovary superior, 2-5-celled with 2 to many ovules in each cell, the simple style with 2-5 stigmas: fr. dry or fleshy, dehiscent or indehiscent.—The African Baobab, *Adansonia digitata*, L., is sometimes cult. in the American tropics. It is said to have the thickest trunk of any tree in the world, with a spread of branches of 30 ft. or more: lvs. palmate: fls. 6 in. across, on long peduncles, the petals soon withering and rolling back, the anthers purplish: fr. 9-12 in. long, densely tomentose, called "monkey's bread."

**CEIBA**, Adans. Large deciduous trees of about 12 species, mostly in trop. Amer. but extending to Asia and Afr.; one species planted as a shade tree in the tropics and the cotton-like material in the seed-pods furnishing the "kapok" of commerce.—Trunk buttressed at base, branches and young trunks spiny: lvs. alternate, petioled, digitately compound with 3-7 entire lfts.: fls. large, in axillary clusters; calyx irregularly 5-lobed; petals tomentose outside; stamens monadelphous, the tube divided at apex into 5 or 10 parts, each bearing a twisting 1-celled anther; ovary 5-celled: fr. a leathery caps. loculicidally dehiscent by 5 valves, the seeds embedded in the cotton-like fiber. (Ceiba: aboriginal name.)

**C. pentandra**, Gaertn. (*C. Casearia*, Medic. *Eriodendron anfractuosum*, DC.). SILK-COTTON-TREE. To 100 ft. or more high, having immense horizontal far-reaching branches and wide-flung thin buttresses or flanges sometimes prominent for 30 ft. or more: lfts. 7, arising from a nearly circular plate or disk at top of petiole, lanceolate or oblong, acuminate, 4-6 in. long, undulate, glabrous: fls. white or rose, in dense clusters to 8 in. long; petals densely white-woolly outside, about 1 in. long, the stamens slightly exserted: caps. oblong, 3-6 in. long, woody. Tropics of Amer., Asia, Afr.

#### 104. STERCULIACEÆ. STERCULIA FAMILY

Trees, shrubs and herbs, or sometimes vines, of about 50 genera and 750 species, nearly all trop., one furnishing cocoa and chocolate, another the cola-nut, and several grown for ornament.—Lvs. alternate, simple or digitate, the stipules mostly deciduous: fls. bisexual or unisexual, usually regular, clustered or rarely solitary; calyx deeply 5-cleft, valvate; petals 5 or 0, hypogynous; stamens 5 or more, in 2 whorls, those opposite the sepals staminodia or lacking, those opposite petals anther-bearing and more or less connate into a tube; ovary superior, usually 5-celled with 2 to many ovules in each cell (sometimes 3-10-celled); styles 2-5, distinct or united: fr. dry, usually dehiscent.

Fls. unisexual or polygamous; petals 0.

Anthers crowded without order.

Fr. woody, not dehiscing until ripe.....1. BRACHYCHITON

Fr. membranaceous, usually dehiscing long before maturity into

lf.-like open carpels.....2. FIRMIANA

Anthers in a single ring.....3. COLA

Fls. bisexual; petals present.

Petals hooded at base: fr. indehiscent.....4. THEOBROMA

Petals flat: fr. dehiscent by 5 valves.

Stamens 10-25: plant a shrub or tree.....5. DOMBEYA

Stamens 5: plant an herb or subshrub.....6. MAHERNIA

1. **BRACHYCHITON**, Schott & Endl. About 11 species of Australian trees, grown for ornament in warm climates.—Fls. unisexual or polygamous, in panicles or rarely racemes, mostly axillary; calyx usually campanulate; petals 0; stamens united into column which bears a head of 10-15 sessile anthers; ovary with 5 cells each 2- to many -ovuled, the style united under the peltate or lobed stigma: fr. a woody follicle, not dehiscing until ripe; seeds and inside of fr. usually hairy, often cohering; radicle next the hilum. (Brachychiton: from Greek, referring to the short imbricated hairs and scales.)

Fls. bright scarlet.....1. *B. acerifolium*

Fls. yellowish-white, sometimes spotted with red.....2. *B. populneum*

1. ***B. acerifolium***, F. Muell. (*Sterculia acerifolia*, A. Cunn.). FLAME-TREE. Glabrous tree to 60 ft. or more: lvs. often 8-10 in. across, long-petioled, deeply 5- or 7-lobed, the lobes oblong-lanceolate to rhomboid, glabrous and shining: fls. brilliant scarlet, the glabrous calyx  $\frac{3}{4}$  in. long; ovary short-stalked, glabrous: fr. large, long-stalked, glabrous. New S. Wales.

2. ***B. populneum***, R. Br. (*Sterculia diversifolia*, Don). Tree to 60 ft., glabrous except the fls.: lvs. various, ovate to ovate-lanceolate and entire or more or less deeply 3- or 5-lobed, long-petioled, acuminate, glabrous and shining: fls. yellowish-white, often dark-spotted, reddish and glabrous inside, tomentose outside when young; ovary slightly tomentose: fr.  $\frac{1}{2}$ -3 in. long, glabrous, on stalks 1-2 in. long. Queensland to Victoria.

2. **FIRMIANA**, Marsigli. About 10 species native in Asia, one planted S. for a lawn and shade tree.—Closely allied to Brachychiton but differing in its membranaceous fr. which usually dehisces long before maturity into lf.-like carpels, the seeds not cohering to the walls of the fr., and the lateral radicle. (Firmiana: after Karl Joseph Graf v. Firmian, 1718-1782, once governor-general of Lombardy.)

**F. simplex**, Wight (*F. platanifolia*, Schott & Endl. *Sterculia platanifolia*, L.). Deciduous smooth-barked round-headed tree to 50 ft. high: lvs. cordate-orbicular.

palately 3-5-lobed, the lobes sharp-pointed, glabrous or tomentose beneath, reaching 1 ft. or more in diam.: fls. small, greenish, the calyx-lobes reflexed: fr. 4-5 in. long, dehiscent into 4 lf.-like carpels which bear wrinkled globose seeds on their margins. China, Japan.

3. **COLA**, Schott. More than 100 species have been described from trop. Afr., one of which is grown in the American tropics for the cola-nut, the kernel being used in medicine and for stimulating drinks.—Lvs. entire or lobed: fls. unisexual or polygamous, in axillary fascicles or panicles; calyx campanulate; petals 0; stamens united into a short column, bearing at top a ring of 10-12 sessile anthers; ovary 3-10-celled with as many styles as carpels, the cells many-ovuled: fr. of 4-5 leathery or woody follicles. (Co-la: native name.)

**C. acuminata**, Schott & Endl. **COLA** or **GOORA NUT**. Tree to nearly 40 ft.: lvs. 6-8 in. long, leathery, obovate, acute, entire, the young lvs. often once or twice cut at base: fls.  $\frac{1}{2}$  in. across, yellow, the tube of calyx green: fr. 5-6 in. long.

4. **THEOBROMA**, L. Small trees native in trop. Amer., of about 20 species, extensively grown for the seed from which commercial chocolate and cocoa are produced.—Lvs. large, simple, entire, leathery and strongly veined: fls. bisexual, small, in few- or many-fl'd. axillary cymes or borne laterally on the branches or trunk; petals hooded at base; stamen-tube short, with 5 petaloid elongated staminodia and 2-3 sessile anthers; ovary sessile, 5-celled and each cell many-ovuled, the stigma 5-lobed: fr. a large woody drupe or pod, the numerous seeds imbedded in the pulp. (Theobroma: Greek *food of the gods*.)

**T. Cacao**, L. **CACAO**. Wide-branching evergreen tree to 25 ft. or more high; twigs pubescent: lvs. oblong-oval or elliptic-oblong, to 1 ft. long, short-petioled, abruptly acuminate: fls. in fascicles directly on bark of trunk and main branches, on slender pedicels  $\frac{1}{2}$  in. or more long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, calyx rose-colored, corolla yellowish: fr. elliptic-ovoid, 1 ft. or less long and about 4 in. diam., 5-ribbed, red, yellow, purplish or brown, the walls thick and hard, the flat seeds about 1 in. across imbedded in white or pinkish pulp. Cent. and S. Amer.

5. **DOMBEYA**, Cav. Probably 100 species of African shrubs or small trees, sometimes grown out-of-doors in warm regions or a few occasionally cult. in the greenhouse.—Lvs. palmately-nerved; often cordate, angled or lobed: fls. rather showy, in axillary or terminal loose cymes or crowded into dense heads, with 3 small unilateral sometimes united bractlets; calyx-lobes at length reflexed, persistent; petals 5, flat; stamens united into a short or elongated tube bearing at apex 5 staminodia alternating with 10-25 anther-bearing stamens which are assembled into 2-5 bundles; ovary sessile, 2-5-celled and each cell 2-ovuled, the 5 styles distinct or connate at base: fr. a caps. loculicidally dehiscent by 5 valves. (Dombeya: after Joseph Dombey, 1742-1795, French botanist.)

Lvs. glabrous beneath, only slightly pubescent when young.....1. *D. natalensis*  
Lvs. tomentose beneath.

Fls. in dense peduncled heads, subtended by large ovate calyculate bracts.....2. *D. Wallichii*

Fls. in a much-branched infl., the bracts linear and minute.....3. *D. spectabilis*

1. **D. natalensis**, Sond. Branches terete, glabrous: lvs. long-petioled, orbicular, cordate, acute or acuminate, dentate or somewhat lobed, slightly pubescent when young: fls. white, fragrant, in umbel-like clusters combined into a panicle, the peduncles slender and pubescent, the involucre bracts linear. Natal.

2. **D. Wallichii**, Benth. & Hook. (*Astrapæa Wallichii*, Lindl.). Tree to 30 ft.: lvs. large, cordate, dentate, densely tomentose beneath with stellate hairs, the stipules large and leafy: fls. scarlet, in dense heads borne on a long hairy peduncle, subtended by large ovate calyculate bracts. (Named for Nathaniel Wallich, 1786-1854, Danish botanist.) Probably Madagascar.

3. **D. spectabilis**, Bojer. Small tree: lvs. long-petioled, orbicular or oblong, cordate, unequally undulate but not dentate, rusty or white-tomentose beneath



with stellate hairs: fls. white,  $\frac{3}{4}$ in. across, the infl. much-branched and many-flid.; involueral bracts minute, linear. Madagascar, E. trop. Afr.

6. **MAHERNIA**, L. Perennial herbs or subshrubs of more than 30 species in Afr., one often grown in greenhouses or hanging-baskets.—Lvs. usually deeply incised: fls. nodding, on usually 2-flid. peduncles, terminal or opposite the lvs.; calyx campanulate; petals 5, flat; stamens 5, opposite petals, the filaments dilated at middle, staminodia 0; ovary 5-celled with 5 styles more or less united at base, cells many-ovuled: fr. a caps. loculicidally dehiscent by 5 valves. (Maher-nia: anagram of *Hermannia*.)

**M. verticillata**, L. (*Hermannia verticillata*, K. Sch.). HONEY-BELL. A procumbent straggly subshrub with ascending or erect scabrous branches to 6 in. high: lvs. small, pinnately cut into linear divisions, the stipules deep-cut and resembling the lvs.: peduncles 2-flid., subtended by linear distinct bracts; fls. about  $\frac{1}{2}$ in. long, very fragrant, honey-yellow, blooming freely in winter and spring. S. Afr.

### 105. DILLENIACEÆ. DILLENIA FAMILY

About 300 species in 11 genera of trees and shrubs, often climbing, or rarely perennial herbs, distributed throughout the tropics.—Lvs. alternate or rarely opposite, entire or dentate, seldom pinnatifid: fls. bisexual, or sometimes polygamous or diœcious, the infl. various; sepals usually 5, imbricated, persistent and often enlarged after flowering; petals usually 5, imbricated, deciduous; stamens very numerous, seldom as few as 10, free or variously united at base; ovary of 1 to many carpels distinct or more or less united, the ovules 1 to many, with as many styles as carpels, usually free and spreading with simple terminal stigma: fr. a hard dehiscent caps., or fleshy and berry-like and indehiscent.

**ACTINIDIA**, Lindl. Climbing shrubs of over 20 species in E. Asia to the Himalayas, planted for the attractive foliage.—Lvs. alternate, entire or serrate, pinnately veined, the minute stipules caducous: fls. polygamous or diœcious, in axillary cymes or solitary; stamens many: fr. a many-celled berry, with numerous small seeds imbedded in pulp. (Actinid-ia: from Greek for ray, referring to the radiate styles.)

Branchlets and under surface of lvs. glabrous or pubescent only on the veins.

Anthers dark purple: lvs. never variegated.....1. *A. arguta*

Anthers yellow: lvs. often variegated.....

Pith of branches white, solid.....2. *A. polygama*

Pith of branches brown, lamellate.....3. *A. Kolomikta*

Branchlets and under surface of lvs. tomentose.....4. *A. chinensis*

1. **A. arguta**, Miq. High-climbing glabrous shrub; pith of branches brown, lamellate: lvs. long-petioled, broad-elliptic or broadly ovate, to 6 in. long, cuneate or truncate at base, abruptly acuminate, finely serrate: fls. white,  $\frac{3}{4}$ in. across, in many-flid. cymes; petals brownish at base; anthers dark purple: fr. nearly globose, greenish-yellow, about 1 in. long, sweet and sometimes eaten. Japan, Korea, Manchuria.

2. **A. polygama**, Maxim. SILVER-VINE. Glabrous climber to 25 ft.; pith of branches white, solid: lvs. long-petioled, broadly ovate to ovate-oblong, to 6 in. long, rounded or subcordate at base, obtuse or abruptly acuminate, serrate, often variegated with white or yellowish, the young lvs. of the staminate plant often silvery-white: fls. white,  $\frac{3}{4}$ in. across, solitary; anthers yellow; ovary bottle-shaped: fr. ovoid, yellow, about  $\frac{3}{4}$ in. long. Japan, Korea, Manchuria to Cent. and W. China.

3. **A. Kolomikta**, Maxim. Glabrous climber to 20 ft. and more; pith of branches brown, lamellate: lvs. long-petioled, ovate, to 5 in. long, rounded or cordate at base, unequally and sharply serrate, often variegated with white or pink: fls. white,  $\frac{3}{4}$ in. across, solitary; ovary cylindric: fr. oblong-ovoid, greenish or yellowish. (Kolomikta: native name.) Japan, Manchuria, Cent. and W. China.

4. *A. chinensis*, Planch. YANGTAO. Climbing to 25 ft., the branchlets densely hairy; pith of branches lamellate: lvs. long-petioled, orbicular or oval, to 5 in. long, cordate or truncate at base, usually rounded or emarginate at apex but sometimes acute, ciliate-serrate, densely whitish-tomentose beneath with stellate hairs: fls. white changing to yellow,  $1\frac{1}{2}$ –2 in. across: fr. ovoid or subglobose, 1–2 in. long, of gooseberry-like flavor and sometimes eaten. China.

### 106. TERNSTRÆMACEÆ. TEA FAMILY

Trees or shrubs native in trop. and warm regions, of 16 genera and about 175 species, some planted for ornament and one furnishing the tea of commerce.—Lvs. alternate, simple, leathery, pinnate-veined, exstipulate: fls. solitary or few together, axillary or terminal, regular, usually bisexual; sepals 5–7, free or somewhat united at base, imbricated, the calyx often with 2 bracts at base; petals usually 5, rarely 4 to many, free or united at base, imbricated; stamens numerous, seldom as few as 5, free or more or less united at base with each other and with base of petals; ovary superior, 2–10-celled with 2 to many ovules in each cell on the inner angles of the cells, with 1 or several styles: fr. a dehiscent caps. or indehiscent, dry or drupaceous.—The family is often known as Theaceæ, but Ternstrœmiaceæ is the older name.

Fr. dehiscent: anthers versatile.

Stamens in 2 series, the outer monadelphous, the inner free.

Fls. pedicelled; sepals persistent..... 1. THEA

Fls. sessile; sepals deciduous..... 2. CAMELLIA

Stamens monadelphous..... 3. STEWARTIA

Stamens 5-adelphous (in groups of 5)..... 4. GORDONIA

Fr. indehiscent: anthers basifixed..... 5. EURYA

1. *THEA*, L. About 14 species of evergreen shrubs or small trees in trop. and subtrop. Asia, one species widely cult. for its lvs. which, when dried and cured, furnish tea.—Lvs. short-petioled, serrate: fls. pedicelled, nodding, solitary or 2–4 together; sepals persistent; petals united at base and with outer series of stamens; stamens numerous, in 2 series, the outer united into a short or long tube, the inner 5–15 and free, anthers versatile; ovary 3–5-celled with 4–6 ovules in each cell, the 3–5 filiform styles united below: fr. a woody caps., loculicidally dehiscent, with persistent axis, each cell with 1 large globose or ovoid unwinged seed. (The-a: the Latinized Chinese name of the tea plant.)

*T. sinensis*, L. (*Camellia Thea*, Link). TEA. Shrub or sometimes tree to 30 ft., glabrous except the young lvs. beneath: lvs. elliptic- or obovate-lanceolate, 2–5 in. long, acute or obtuse, short-toothed: fls. white, fragrant, 1–1½ in. across; ovary villous. China, India.—Several vars. are cult., the most important being: Var. *Bohea*, Pierre (*T. Bohea*, L.). Branches erect: lvs. elliptic-oblong, obtuse, dark green: fls. usually solitary; styles connate below. Var. *viridis*, Pierre (*T. viridis*, L.). Branches spreading: lvs. oblong-lanceolate, acutish, light green: fls. 1–4 together; styles free. Var. *cantonensis*, Pierre (*T. cantoniensis*, Lour.). Lvs. oblong-lanceolate: fls. solitary, usually terminal; styles free only at apex. Var. *assamica*, Pierre (*T. assamica*, Mast.). Lvs. oblong-lanceolate, acuminate: fls. 1–4 together; styles free only at apex.

2. *CAMELLIA*, L. Evergreen trees or shrubs grown for their showy fls. and handsome foliage, of about 10 species in trop. and subtrop. Asia.—Often united with Thea from which it differs in its sessile erect fls. and deciduous sepals. (Camel-lia: after George Joseph Camellus or Kamel, a Moravian Jesuit, who traveled in Asia in 17th century; in English, usually pronounced as if Came-lia.)

Fls. 3–7 in. across.

Lvs. very shining above..... 1. *C. japonica*

Lvs. not shining above..... 2. *C. reticulata*

Fls. 1½–2 in. across..... 3. *C. Sasanqua*

1. *C. japonica*, L. (*Thea japonica*, Nois.). Glabrous shrub or tree sometimes to 40 ft.: lvs. ovate or elliptic, 2-4 in. long, acuminate, very shining and dark green above; fls. red in the type, 3-5 in. across; petals 5-7, roundish; ovary glabrous. China, Japan.—Runs into white, pale rose, and variously double kinds. There are many named vars.

2. *C. reticulata*, Lindl. (*Thea reticulata*, Pierre). Large glabrous shrub: lvs. elliptic-oblong, 3-5 in. long, acuminate, reticulate, dull green and not shining above; fls. purplish-rose, 5-7 in. across; petals 15-20, obovate, loosely arranged; ovary pubescent. China.—There is a var. with about twice as many petals.

3. *C. Sasanqua*, Thunb. (*Thea Sasanqua*, Nois.). Loose straggling shrub, the young branches pubescent: lvs. elliptic to oblong-ovate, 1-2 in. long, bluntly pointed, shining dark green and hairy on the midrib above; fls. white, 1½-2 in. across; petals 5 or more, obovate or oblong; ovary pubescent. (*Sasanqua*: from a Japanese vernacular name.) China, Japan.—Runs into many forms, some with double fls.

3. **STEWARTIA**, L. Six species of deciduous trees or shrubs in E. N. Amer. and E. Asia, a few planted for their showy fls.—Bark smooth, flaky: lvs. short-petioled, serrate; fls. solitary, axillary, short-peduncled; sepals 5-6 subtended by 1 or 2 bracts; petals 5-6, connate below with each other and with the numerous stamens, anthers versatile; ovary 5-celled with 2 ovules in each cell, styles 5, free or united: fr. a woody caps. loculicidally dehiscent by 5 valves, the seeds usually narrowly winged. (*Stewartia*, sometimes incorrectly written *Stuartia*: after John Stuart, Earl of Bute, 1713-1792, patron of botany.)—Aside from the following, two species native in S. U. S. may sometimes be cult.: *S. Malacodendron*, L., with white fls. 3-4 in. across, purple stamens and united styles; *S. pentagyna*, L'Her., with cream-colored fls. 2-3 in. across, white stamens with orange anthers, and 5 distinct styles.

*S. Pseudo-Camellia*, Maxim. Upright shrub or tree to 50 ft. or more; bark red, peeling off in thin flakes: lvs. elliptic to elliptic-lanceolate, 1-3 in. long, acute or acuminate, bright green and glabrous or nearly so: fls. white, 2-2½ in. across; petals silky-pubescent outside; stamens whitish with orange anthers: seeds narrowly winged. Japan.

4. **GORDONIA**, Ellis. Evergreen or deciduous trees or shrubs sometimes planted for ornament; of about 15 species in S. U. S. and trop. and subtrop. Asia.—Lvs. petioled, entire or serrate; fls. solitary, axillary, the calyx subtended by 2-5 caducous bracts; sepals and petals 5; stamens numerous, usually in fascicles of 5 and adnate to petals, or united into a ring, anthers versatile; ovary sessile, 3-5-celled with 4-8 ovules in each cell, the single style with 3-5-lobed stigma: fr. a woody caps. loculicidally dehiscent by 5 valves, the axis persistent; seeds flat, usually winged. (*Gordonia*: after James Gordon, 1728-1791, English nurseryman.)—The Loblolly Bay, *G. Lasianthus*, Ellis, native from Va. to Fla., is sometimes transferred. It is an evergreen tree to 60 ft. or more, with fragrant long-pedicelled white fls.

*G. alatomaha*, Sarg. (*Franklinia alatomaha*, Marsh.). Deciduous tree to 20 ft.: lvs. obovate-oblong, 5-6 in. long, remotely serrate usually above the middle only, bright green and shining above, pale beneath, turning scarlet in fall: fls. white, about 3 in. across, short-pedicelled: caps. globose, ¾ in. diam., the seeds not winged. Ga., near Ft. Barrington on the Altamaha (Alatomaha) River, but not found wild since 1790; now known only in cult.

5. **EURYA**, Thunb. More than 35 species of evergreen shrubs or trees in the warmer parts of Asia and Amer., a few sometimes grown in greenhouses or in the open in the S.—Fls. bisexual, polygamous, or dioecious, solitary or in axillary clusters; sepals and petals 5; stamens many, seldom 5-6, free or adnate to the base of the petals, anthers basifixed; ovary 2-5-celled with many ovules in each cell attached to a central placenta, the styles 3-5 or united into 1: fr. a berry. (*Eurya*: Greek for *large* or *broad*, but of no application here.)

- Lvs. irregularly toothed: anthers glabrous ..... 1. *E. japonica*  
 Lvs. entire: anthers pilose..... 2. *E. ochnacea*

1. *E. japonica*, Thunb. Glabrous shrub: lvs. short-petioled, usually elliptic or oblanceolate, short-pointed, irregularly toothed: fls. small, dioecious, greenish-white, in small clusters, the calyx with 2 persistent bracts at base; sepals and anthers glabrous. *E. Asia*.—There are variegated kinds in which the lvs. are blotched with white.

2. *E. ochnacea*, Szysz. (*Cleyera japonica*, Sieb. & Zucc. *C. ochnacea*, DC.). Lvs. oval-oblong, acuminate, entire, glossy: fls. bisexual, creamy-white, fragrant, in small clusters, the calyx with 2 minute bracts at base; anthers pilose: berries red. Himalayas to Japan.—There is a variegated-leaved var.

### 107. GUTTIFERÆ. GARCINIA FAMILY

About 45 genera and nearly 700 species in the tropics and temp. regions of both hemispheres; herbs, trees, or shrubs, one yielding the mangosteen, another the mamee-apple, and many of the hypericums grown for ornament.—Juice often resinous, yellow or greenish: lvs. opposite, rarely verticillate, pinnate-veined, usually simple and entire, exstipulate: fls. regular, polygamo-dioecious or bisexual, solitary or in cymes which may be united in a compound infl.; sepals and petals 2–6, rarely many, imbricated; stamens numerous, hypogynous, the filaments free or variously united, sometimes forming a globular mass; ovary 2- to many- rarely 1-celled, with 1 to many ovules in each cell, style long or short or none, free or united, the stigmatic lobes often thick and radiating: fr. fleshy or coriaceous, an indehiscent berry or drupe, or septicidally dehiscent. *A*, Fig. 11, page 503.

Plant a tree with large leathery lvs.

Sepals 4..... 1. GARCINIA

Sepals 2..... 2. MAMMEA

Plant an herb or shrub, the lvs. small and herbaceous..... 3. HYPERICUM

1. **GARCINIA**, L. Trees native in the Old World tropics, of about 150 species, the mangosteen grown for its delicious fr.; the yellow resinous juice of many species yields commercial gamboge.—Fls. polygamous, axillary or terminal; sepals and petals 4; stamens free or united at base into 1–5 fascicles or united into an entire or 4-lobed mass; staminodia 8 to many in pistillate fls., free or variously united; ovary 2–12-celled with 1 ovule in each cell; stigma broadly peltate, entire or with radiating lobes: fr. a hard indehiscent berry, the seeds surrounded by a pulpy aril. (*Garcinia*: after Laurence Garcin, French botanist and traveler; died 1752.)

**G. Mangostana**, L. **MANGOSTEEN**. Slow-growing compact tree to 30 ft.: lvs. elliptic-oblong, 6–10 in. long, acuminate, thick and leathery, with numerous horizontal nerves: staminate fls. in 3–9-flid. terminal fascicles; bisexual fls. solitary or in pairs at ends of branches, 2 in. across; petals fleshy, rose-pink; stigma sessile, 4-lobed: fr. about 2½ in. diam., reddish-purple, the large leathery sepals persistent; rind thick and tough, inclosing 5–7 white segms. resembling an orange, the seeds thin and small or sometimes lacking. (*Mangostana*: adaptation of the Malayan name.) Malay region.

2. **MAMMEA**, L. Probably about a half-dozen trees in the tropics of Amer., Afr., and Asia, although the genus is sometimes defined to include only the American species which is widely cult. for its edible fr.; a liqueur is also distilled from the fls.—Fls. polygamous, axillary, solitary or few together; calyx closed before flowering, then separating into 2 valvate sepals; petals 4–6; stamens free or united at base; ovary 2–4-celled, with 1–2 ovules in each cell; style short with peltate stigma entire or broadly 4-lobed: fr. a 1–4-seeded indehiscent drupe. (*Mammea*: from *mamey*, the aboriginal W. Indian name of *M. americana*.)





FIG. 11. STRUCTURES GUTTIFERÆ TO CORNACEÆ.

*A*, *Hypericum*. *B*, *Lythrum Salicaria*, flower and pod, enlarged. *C*, *Cuphea*, side view below and front view above. *D*, *Conium maculatum*; *Dd*, fruit; *Ddd*, carpels in section. *E*, *Coriandrum*; whole fruit at right; section at left. *F*, *Daucus Carota*, fruit and section. *G*, *Pastinaca sativa*, fruit and section. *H*, *Hydrocotyle americana*. *I*, *Cornus*; *Ii*, flower.

**M. americana**, L. MAMMEE-APPLE. MAMEY. Upright compact tree to 60 ft.: lvs. oblong-obovate, 4-8 in. long, rounded or blunt at apex, thick and glossy, with numerous fine transverse veins and pellucid dots: fls. white, fragrant, 1 in. across: fr. oplate to globose, 4-6 in. diam., the surface russet and slightly roughened, the 1-4 large seeds surrounded by bright yellow flesh. W. Indies, N. S. Amer.

3. **HYPERICUM**, L. ST. JOHNS-WORT. About 200 species of herbs, subshrubs, or rarely trees, mostly in temp. and subtrop. regions of the northern hemisphere, grown out-of-doors for their attractive fls.—Lvs. opposite, entire, sessile or short-petioled, exstipulate, dotted with pellucid glands: fls. in many-fld. cymes or sometimes solitary, yellow, rarely pink or purplish; sepals 5, imbricate or valvate, often unequal; petals 5, oblique, convolute in the bud; stamens numerous, free or usually connate at base into 3 or 5 bundles opposite the petals, sometimes with hypogynous glands alternating with petals; ovary superior, 1-5-celled, with 3-5 parietal placentæ and numerous ovules, the 3-5 styles usually distinct: fr. a septicidally dehiscent caps. or rarely a berry. (Hypericum but by usage Hypericum: Greek name of obscure meaning.)—Aside from the following, a number of other native species are likely to be planted.

Styles 5.

Lvs. oblong-linear: fls.  $\frac{1}{2}$ -1 in. across.....1. *H. Kalmianum*

Lvs. ovate-oblong: fls.  $1\frac{1}{2}$ -3 in. across.

Fls.  $1\frac{1}{2}$ -2 in. diam.....2. *H. patulum*

Fls. 2-3 in. diam.

Plant 1 ft. or less high.....3. *H. calycinum*

Plant about 2 ft. high.....4. *H. Moserianum*

Styles 3.

Diam. of fls.  $\frac{1}{2}$ - $\frac{3}{4}$  in.

Caps.  $\frac{1}{2}$  in. long.....5. *H. prolificum*

Caps.  $\frac{1}{4}$  in. long.....6. *H. densiflorum*

Diam. of fls. 1-2 in.

Fls. solitary or 2-3 together.....7. *H. aureum*

Fls. in many-fld. panicles.....8. *H. floribundum*

1. **H. Kalmianum**, L. Freely-branching evergreen shrub 2-3 ft. high: lvs. oblong-linear to oblanceolate, 1-2 $\frac{1}{2}$  in. long, obtuse, more or less glaucous below, often with smaller lvs. crowded in axils: fls.  $\frac{1}{2}$ -1 in. diam., in few-fld. cymes, in Aug.; sepals foliaceous, about half length of petals; stamens distinct; styles 5, united below into a beak: caps. ovoid,  $\frac{1}{4}$  in. long. (Bears the name of Peter Kalm, 1715-1799, Swedish botanist who traveled in N. Amer.; page 574.) Que. to Ill.

2. **H. patulum**, Thunb. Evergreen spreading shrub to 3 ft. high, with purplish arching 2-edged branches: lvs. ovate-lanceolate or ovate-oblong,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, obtuse or somewhat acute: fls.  $1\frac{1}{2}$ -2 in. diam., solitary or in cymes, blooming from July-Sept.; sepals suborbicular, nearly equal, longer than half the petals; stamens in 5 fascicles; styles 5: caps. ovate,  $\frac{1}{2}$  in. long. Japan.—Var. **Henryi**, Veitch, is of hardy and vigorous growth, with obtuse lvs. 2-3 in. long and fls. 2-2 $\frac{1}{2}$  in. across. (Named for Augustine Henry, page 156.) China.

3. **H. calycinum**, L. AARONS BEARD. A stoloniferous evergreen subshrub 1 ft. or less high, the many procumbent or ascending 4-angled sts. occurring in thick tufts: lvs. ovate-oblong or oblong, 2-4 in. long, obtuse, glaucous beneath: fls. 3 in. diam., solitary or 2-3 together, blooming from July to Sept.; sepals large and spreading, enlarging in fr.; stamens in 5 fascicles; styles 5, divergent: caps. ovate,  $\frac{1}{2}$  in. long. S. E. Eu., Asia Minor.

4. **H. Moserianum**, André (*H. patulum*  $\times$  *H. calycinum*). GOLD-FLOWER. Erect subshrub to 2 ft. high, with arching reddish branches: lvs. ovate, obtuse, to 2 in. long, glaucous beneath: fls. 2-2 $\frac{1}{2}$  in. across, in cymes of 1-5, blooming in July and Aug. (Named for Mr. Moser, who raised the hybrid in his nursery at Versailles in 1887.)—There is a form in which the lvs. are edged with red and white.

5. **H. prolificum**, L. Dense erect evergreen shrub to 5 ft. high, the twigs 2-angled: lvs. narrowly oblong or oblanceolate, 1-3 in. long, obtuse, glossy dark green above, pale beneath, with tufts of small lvs. in the axils: fls.  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, in several- to many-fld. cymes, blooming from July to Sept.; stamens distinct; styles 3: caps. oblong,  $\frac{1}{2}$  in. long. Sandy and rocky soil Ont. to Minn. and Ga.

6. **H. densiflorum**, Pursh. Much-branched evergreen shrub to 6 ft. high, densely leafy, the twigs 2-angled: lvs. linear-oblong to linear, 1-2 in. long, revolute,

acute or obtuse, with many small lvs. crowded in axils: fls. about  $\frac{1}{2}$  in. across, in dense many-fl. cymes, blooming from July–Sept.; stamens distinct; styles 3, more or less united: caps. ovoid,  $\frac{1}{4}$  in. long. N. J. to Fla. and Tex.

7. *H. aureum*, Bartram. Deciduous shrub to 4 ft. high, of dense rounded habit: lvs. ovate-oblong to oblong, 1–3 in. long, obtuse and mucronulate, bluish-green, pale beneath: fls. 1–2 in. across, sessile, solitary or few together, July–Aug.; sepals unequal, foliaceous; petals somewhat deflexed; stamens distinct; styles 3: caps. ovoid-conic, about  $\frac{1}{2}$  in. long. S. C. to Tenn. and Tex.

8. *H. floribundum*, Dry. Shrub to 6 ft. and more high: lvs. lanceolate-elliptic, 1–1½ in. or more long, light green: fls. 1½–2 in. across, in many-fl. panicles, the peduncles dilated; stamens in 3 fascicles, the petals and stamens persistent; styles 3, long and divergent. Canary and Madeira Isls.

### 108. TAMARICACEÆ. TAMARISK FAMILY

Shrubs or small trees from the Medit. region and Afr. to E. Asia, of 4 genera and about 100 species, several of the tamarisks planted for ornament.—Lvs. alternate, mostly small and sessile, scale-like, ericoid, exstipulate: fls. regular, bisexual, solitary or in terminal racemes or panicles; sepals 4–5, free or more or less united; petals 4–5, imbricated, usually withering and persistent; stamens as many or twice as many as petals, free or united, inserted on a more or less evident disk; ovary superior, 1-celled, with 2 to many ovules attached at the base of the 3–4 parietal placentæ, the 3–4 styles free or united: fr. a caps. dehiscent to base, the seeds densely bearded or rarely winged.—The **FOUQUIERACEÆ** or Candlewood Family is often united with Tamaricaceæ but differs in having the petals united into a tube, in the hairy ligule-bearing stamens, and the ovules attached to the middle rather than at base of the placenta. *Fouquieria splendens*, Engelm., COACH-WHIP, VINE-CACTUS, JACOBS STAFF, OCOTILLO, is sometimes planted as a hedge: shrub to 20 ft. high, branching near base, the erect branches long, gray, furrowed: spines (which are formed by the hardened midribs of lvs. of previous years) slender, spreading: lvs. obovate, rounded,  $\frac{1}{2}$ –1 in. long: fls. bright scarlet, about 1 in. long, in terminal racemes or panicles, the stamens exserted: caps. about  $\frac{1}{2}$  in. long, the white seeds having a long fringe of spirally thickened hairs. W. Tex., Ariz. to S. Calif.

**TAMARIX**, L. TAMARISK. About 75 species of deciduous or sometimes evergreen shrubs or trees from the Medit. region to E. Indies and Japan.—Technical characters as for the family. (Tam-arix: ancient Latin name.)—The species are very much alike and difficult to distinguish except by technical characters. Aside from the following, *T. articulata*, Vahl, from W. Asia, has been introduced as a windbreak in the desert regions of S. Calif. It is a tree to 30 ft., with slender jointed branches: lvs. minute, sheathing, glabrous and glaucous: fls. pink, sessile in terminal panicles, 5-parted; stamens deeply inserted between lobes of disk.

Fls. in terminal panicles, appearing in summer.

Lvs. glabrous.

Petals deciduous from half-ripe or mature frs., spreading; disk 5-angled or 5-lobed.

Stamens inserted between the shallow lobes of the disk; fl.-buds subglobose.....1. *T. gallica*

Stamens inserted on the corners of the 5-angled disk; fl.-buds ovoid.....2. *T. anglica*

Petals persistent; stamens deeply inserted between the lobes of the disk.

Bracts ovate-lanceolate; disk 10-lobed.....3. *T. pentandra*

Bracts subulate.

Disk 5-lobed.....4. *T. odessana*

Disk deeply 10-lobed.....5. *T. chinensis*

Lvs. finely pubescent.....6. *T. hispida*

Fls. in racemes lateral on last year's branches, appearing in spring.

Sepals, petals, and stamens 5.....7. *T. juniperina*

Sepals, petals, and stamens 4.....8. *T. parviflora*

1. *T. gallica*, L. Shrub or small tree to 12 or sometimes 30 ft. high, with slender spreading branches: lvs. rhombic-ovate, acute or acuminate, keeled, the margins scarios, glaucous: fls. white or pinkish, almost sessile, in slender paniced racemes in early summer, the fl.-buds subglobose; petals deciduous; stamens 5, inserted between shallow lobes of disk. W. Eu. to Himalayas; escaped in Tex. and New Mex.

2. *T. anglica*, Webb. Closely allied to *T. gallica* and by some botanists united with it, differing in its ovoid fl.-buds and the stamens being inserted on the corners of the 5-angled disk. W. Eu.

3. *T. pentandra*, Pall. (*T. hispida æstivalis*, Hort.). Shrub or small tree to 15 ft. or more high, with purple plumose branches: lvs. lanceolate to ovate, acute, glaucous or pale green: fls. pink, in dense racemes forming large panicles sometimes 3 ft. long, in late summer; bracts ovate-lanceolate, as long or slightly longer than pedicels; petals 5, persistent; stamens deeply inserted between the lobes of the 10-lobed disk. S. E. Eu. to Cent. Asia.

4. *T. odessana*, Stev. Shrub to 6 ft. high, with slender upright branches: lvs. lanceolate, subulate, decurrent: fls. pink, in slender racemes forming a large loose panicle, in summer; bracts subulate; pedicels about as long as lobes of the 5-lobed disk. Caspian region.

5. *T. chinensis*, Lour. Shrub or small tree to 15 ft. high, with slender spreading or drooping branches: lvs. lanceolate, keeled, bluish-green: fls. pink, in loose usually nodding panicles, in summer; bracts subulate; disk deeply 10-lobed. China.

6. *T. hispida*, Willd. Shrub to 4 ft. high, with slender upright branches downy when young: lvs. broad at base, bluish-green, finely pubescent: fls. pink, almost sessile, in dense racemes forming terminal panicles, in late summer; petals deciduous; disk 5-lobed. Caspian region.

7. *T. juniperina*, Bunge (*T. japonica* and *T. plumosa*, Hort.). Shrub or small tree to 15 ft. high, with slender spreading branches: lvs. oblong-lanceolate: fls. pinkish, appearing in spring in lateral racemes on branches of the previous year; sepals, petals and stamens 5; petals persistent; disk 5-lobed. N. China, Japan.

8. *T. parviflora*, DC. Shrub or small tree to 15 ft. high, with slender spreading branches and reddish-brown bark: lvs. ovate: fls. pink, very short-pedicelled, appearing in spring in short lateral racemes on last year's branches; sepals, petals and stamens 4; petals persistent. S. Eu.

## 109. CISTACEÆ. ROCK-ROSE FAMILY

Shrubs or woody herbs, about 8 genera and 160 species now recognized, native mostly in the northern hemisphere, a few planted for ornament.—Lvs. opposite or sometimes alternate, simple, entire, the stipules leafy, small or 0: fls. regular, usually bisexual, solitary or in racemes or panicles; sepals 5, the 2 outer smaller and bract-like or lacking, the 3 inner ones convolute, persistent at least until fruiting; petals 5, rarely 3 or 0, usually fugacious; stamens numerous, hypogynous, the filaments free and slender; ovary superior, sessile, 1-celled or falsely 5–10-celled by ingrowing partitions, with 2 to many ovules borne on parietal placenta; style simple with entire or 3-lobed stigma: fr. a caps. dehiscent by 3–10 valves.

Valves of caps. and placenta of ovary 5 or 10.....1. *CISTUS*

Valves of caps. and placenta of ovary 3.....2. *HELIANTHEMUM*

1. *CISTUS*, L. ROCK-ROSE. About 20 species in the Medit. region, low shrubs adapted to planting in rockeries.—Lvs. opposite, exstipulate: fls. showy, in terminal, simple or compound cymes, rarely solitary; sepals 3 or 5; petals 5; stamens numerous; ovary with 5 placenta bearing many ovules, the short or elongated style with a large 5–10-lobed stigma: caps. loculicidally dehiscent into 5, or seldom 10, valves, the fruiting pedicels erect. (Cis-tus: ancient Greek name.)—There are many garden and natural hybrids.

Fls. white.

Sepals 5.

Lvs. sessile, lanceolate to linear-lanceolate.....1. *C. monspeliensis*

Lvs. petioled, oval to ovate-oblong.....2. *C. salvifolius*



## Sepals 3.

- Lvs. lanceolate, nearly sessile ..... 3. *C. ladaniferus*  
 Lvs. ovate to ovate-lanceolate, petioled ..... 4. *C. laurifolius*  
 Fls. lilac or rosy ..... 5. *C. albidus*

1. *C. monspeliensis*, L. Erect shrub to 5 ft.: lvs. sessile, lanceolate to linear-lanceolate,  $\frac{3}{4}$ –2 in. long, obtuse or acutish, 3-nerved, rugose, the margins more or less revolute, pilose on nerves with long adpressed hairs: fls. white, about 1 in. across, in 3–10-fld. cymes; pedicels and 5 sepals hirsute: caps. globose, shining, the seeds blackish. S. Eu.

2. *C. salvifolius*, L. Erect or procumbent much-branched shrub to 2 ft. high: lvs. petioled, oval or ovate-oblong,  $\frac{1}{2}$ – $1\frac{1}{4}$  in. long, rigid, very rugose above, tomentose on both sides: fls. white with yellow spot at base of petals, about  $1\frac{1}{2}$  in. across, solitary or several together; sepals 5, cordate-ovate, acuminate, densely tomentose outside: caps. ovate, 5-angled, pubescent, the seeds blackish. Medit. region.

3. *C. ladaniferus*, L. Erect glutinous shrub to 5 ft. high: lvs. nearly sessile, lanceolate to linear-lanceolate,  $1\frac{1}{2}$ –4 in. long, acute, dark green, glabrous and viscid above, whitish-tomentose beneath: fls. white with yellow spot at base of each petal, 3– $3\frac{1}{2}$  in. across, usually solitary at the tips of axillary branches; bracts deciduous, the upper ones very broad, silky-haired on margins; sepals 3, orbicular, scaly, yellowish: caps. globose, 10-valved, the seeds tawny. S. W. Eu.

4. *C. laurifolius*, L. Stiff erect shrub 6–8 ft. high: lvs. petioled, ovate or ovate-lanceolate, 1– $2\frac{1}{2}$  in. long, acuminate, the margins undulate, 3-nerved, glabrous above, whitish or brownish-tomentose beneath: fls. white, with yellow blotch at base of petals, 2–3 in. across, in several-fld. cymes at the ends of axillary branches; bracts leathery, deciduous; sepals 3, oval, apiculate, silky-tomentose: caps. ovate, tawny, densely villous, 5-valved, the seeds tawny. Medit. region.

5. *C. albidus*, L. Erect shrub 4–6 ft. high, the young parts densely white-tomentose: lvs. sessile, elliptic or ovate-oblong,  $\frac{3}{4}$ –2 in. long, 3-nerved to apex, margins revolute, densely tomentose on both sides, reticulate beneath: fls. lilac or rosy,  $2\frac{1}{2}$  in. across, solitary or few together; bracts small, deciduous; sepals 5, ovate, acuminate: caps. ovoid, silky-hairy, the seeds tawny. Medit. region.

2. **HELIANTHEMUM**, Adans. SUN-ROSE. As broadly defined, about 120 species in the Medit. region, N. and S. Amer., but separated into several genera by some authors; herbs or subshrubs, only one commonly grown in N. Amer. in rockeries or borders.—Lvs. opposite or the upper ones alternate, with or without stipules: fls. in simple or compound terminal racemes; sepals 5, the 2 outer smaller, enlarging in fr.; petals 5, sometimes very small or lacking; stamens numerous; ovary with 3 parietal placentæ bearing 2–12 ovules, the style slender or short: caps. dehiscent into 3 valves, the fruiting pedicels often recurved. (*Helianthemum*: Greek for *sunflower*.)

*H. Chamæcistus*, Mill. (*H. vulgare*, Gaertn.). A procumbent subshrub to about 1 ft. high, the young sts. erect or ascending: lvs. petioled, ovate to linear-lanceolate,  $\frac{1}{2}$ –2 in. long, flat, sometimes green on both sides but usually white-tomentose beneath; stipules leafy, longer than petioles: fls. in many-fld. loose racemes, yellow but in cult. varying from white to purple and rose, about 1 in. across; outer sepals much shorter than broadly oval inner ones: caps. ovoid, slightly inflated, tomentose. (*Chamæcistus*: dwarf *cistus*, an herbalist name.) Eu., W. Asia, N. Afr.—Exceedingly variable, many forms being cult. in Eu.

## 110. BIXACEÆ. BIXA FAMILY

Trees or shrubs, of 4 genera and about 20 species, widely distributed in the tropics; one species furnishes the “annatto” dye which is extracted and prepared from the pulp around the seeds.—Lvs. alternate, simple, entire, dentate or lobed, stipules usually soon deciduous: fls. bisexual, regular, paniculate; sepals 4–5, free, imbricated; petals 4–5, imbricated and twisted in the bud; stamens numerous, free or slightly connate at base; ovary superior, 1-celled or falsely more or less several-celled by the ingrowing of the parietal placentæ, the ovules many; style 1: fr. a caps. dehiscent by 2–5 valves.

**BIXA**, L. One tree native in trop. Amer. but widely distributed and run wild throughout the tropics.—Lvs. large, entire, palmately-veined: fls. showy, in terminal panicles; sepals 5, glandular at base, deciduous; petals 5: caps. ovoid, red-brown, 2-valved, soft-spiny. (Bix-a: S.American name.)

**B. Orellana**, L. **ANNATTO**. **ARNOTTO**. Shrub or small tree usually 10–12 ft. high: lvs. slender-petioled, ovate, 3–7 in. long, cordate or truncate at base, acuminate: fls. pink or rose, about 2 in. across: caps. 1–2 in. long. (Orellana: from a tributary of the Amazon.)

### 111. VIOLACEÆ. VIOLET FAMILY

Herbs, shrubs, or rarely trees, of 15 genera and about 400 species of wide distribution; the pansies and violets are among the best-known garden fls. and one is also forced in the greenhouse.—Lvs. alternate or basal, rarely opposite, simple, entire or sometimes laciniate, stipulate: fls. irregular or regular, bisexual, rarely polygamous or dioecious, solitary or in racemes, spikes, or fascicles, the peduncles usually 2-bracted; sepals 5, free or slightly connate, usually persistent; petals 5, hypogynous, the lower one usually larger than the others and saccate or spurred; stamens 5, alternate with petals, connate into ring around the ovary, often dissimilar and the 2 lower spurred or appendaged; ovary free, sessile, 1-celled, with 3, seldom 2–5, parietal placentæ bearing 1 to many ovules; style simple: fr. a caps. dehiscent by valves or rarely an indehiscent berry.

**VIOLA**, L. **VIOLET**. Probably 300 species of perennial herbs, rarely subshrubs, stemless or leafy-stemmed, native in both the north and south temp. zones.—Stipules persistent, often leafy: peduncles axillary, 1- or rarely 2-fld.; fls. of two kinds, those in spring with showy petals and those in summer cleistogamous, apetalous, and bearing abundant seeds; petaliferous fls. nodding, the lower petal spurred and the other 4 in 2 unlike pairs; stamens 5, short, the 2 lower with nectar-bearing appendages projecting backward into the spur: caps. dehiscent into 3 boat-shaped valves with thick rigid keels, the drying and contracting of the thin sides causing the seeds to be forcibly discharged. (Vi-ola: classical name.)—Many attractive species are native in N. Amer.

Plant stemless, the peduncles arising directly from base or crown.....1. *V. odorata*

Plant with evident sts., the peduncles arising some distance from ground.

Petals separate, obovate: plant tufted.....2. *V. cornuta*

Petals imbricated, nearly or quite orbicular: plant not tufted.....3. *V. tricolor* var. *hortensis*

1. ***V. odorata***, L. **SWEET, GARDEN or FLORISTS VIOLET**. Tufted, stemless, producing long prostrate stolons flowering the second year: lvs. cordate-ovate to reniform, obtusely serrate, the stipules ovate-lanceolate, acuminate: peduncles arising directly from base or crown, bracted at about the middle; fls. deep violet, rarely rose or white, fragrant; spur short, obtuse, nearly straight; style terminating in a slender hooked beak. Eu., Afr., Asia.—Runs into many forms varying in stature, size and color of fls.; there are double-fld. strains.

2. ***V. cornuta***, L. **HORNED VIOLET**. **TUFTED or BEDDING PANSY**. Tufted perennial, producing evident sts.: lvs. ovate, slightly cordate, usually acuminate, crenately serrate, the stipules large, triangular, coarsely dentate, ciliate: peduncles long; fls. violet, white in one var., the obovate obtuse petals standing well apart, spur slender, acute, about as long as calyx; style enlarged upward. Spain and Pyrenees.—A garden group of various colors. Var. *admirabilis*, Hort., may be a hybrid offshoot of *V. cornuta*.

3. ***V. tricolor***, L., var. *hortensis*, DC. **PANSY. HEARTSEASE**. Annual or short-lived perennial, the sts. becoming long and much branched: basal lvs. round-cordate; st.-lvs. ovate-oblong or lanceolate, crenate-dentate, petioled, the large stipules pinnately parted toward base: fls. large, usually having three colors, mostly blue,

whitish, and yellow; petals nearly or quite orbicular, imbricated, spur short and obtuse; style enlarged upward. Eu.—The pansy is one of the oldest garden fls. and is usually considered an offshoot of *V. tricolor*; it is likely, however, that other wild species are involved in its parentage, and probably a separate designation should be given it.

## 112. FLACOURTIACEÆ. FLACOURTIA FAMILY

Evergreen trees and shrubs of about 70 genera and 500 species in trop. regions, the governors-plum and the kei-apple planted for hedges in warm countries and the frs. also made into jams and preserves.—Lvs. mostly alternate (so in ours), simple, entire or dentate, the stipules usually deciduous: fls. regular, bisexual or unisexual, solitary in the axils or in axillary or terminal clusters or racemes; floral envelopes imbricated; sepals 4 or more, free or united; petals free, as many as sepals or rarely more, sometimes wanting, often inserted on outer edge of a hypogynous or perigynous swollen disk, usually small; stamens numerous, seldom as few as petals and then alternate with sepals, in 1 or several series or in bundles opposite the petals, staminodia sometimes present; ovary superior or nearly so, 1-celled, with few or many ovules borne on parietal placentæ, the styles as many as placentæ, free or united, or sometimes 2- or more-celled: fr. a caps., berry or drupe.

Styles 2 or more; ovary incompletely 2-8-celled.

Sepals imbricated: ovules many: seed inclosed in stone-like covering... 1. FLACOURTIA

Sepals scarcely imbricated: ovules 1-6: seeds without stone-like

covering..... 2. DOVYALIS

Styles 1; ovary 1-celled..... 3. AZARA

1. **FLACOURTIA**, Comm. Fifteen or more species of shrubs or small trees, often spine-bearing, native in trop. Afr., Asia, and adjacent isls.—Lvs. short-petioled, usually dentate, pinnate-veined, without stipules: fls. small, bisexual or polygamous, usually in small racemes or clusters, with small bracts; sepals 4-5, scale-like, slightly united at base, ciliate, imbricated, sometimes persistent; petals 0; stamens many, the filaments long and slender; ovary superior, incompletely 2-8-celled, surrounded by a lobed and glandular disk and sometimes by staminodia, ovules many on each placenta; styles 2-6 or many, free or slightly united at base: fr. an indehiscent berry-like drupe, each seed inclosed in a stone-like covering. (Flacourtia: after Etienne de Flacourt, 1607-1660, General Director French East India Co. and Governor of Madagascar.)

*F. indica*, Merr. (*F. Ramontchi*, L'Her.). GOVERNORS-PLUM. BATOKO-PLUM. Glabrous shrub or tree to 25 ft. high, with or without axillary spines: lvs. ovate to elliptic, 2-3 in. long, acuminate, crenate-dentate: fls. yellowish: fr. globose,  $\frac{1}{2}$ -1 in. diam., deep maroon-colored, with juicy pulp surrounding the small thin seeds. S. Asia, Madagascar.

2. **DOVYALIS**, E. Mey. (Sometimes spelled *Doryalis*). About 11 species of shrubs or small trees, with or without axillary spines, native in Afr. and Ceylon.—Lvs. short-petioled, pinnate-veined and usually 3-nerved at base, the stipules very small and deciduous: plant dicecious: staminate fls. many in the axils, with 4 seldom 5-7 hairy sepals, no petals, and numerous stamens on a fleshy disk alternating with large glands; pistillate fls. solitary or few together, with 5-9 hairy glandular sepals persistent until fruiting, no petals, sometimes staminodia; ovary completely or incompletely 2-8-celled with 1-6 ovules on each placenta and 2-8 styles: fr. an indehiscent berry. (Dovyalis: name unexplained.)—The Kitambilla or Ceylon-Gooseberry, *D. hebecarpa*, Warb. (*Aberia Gardneri*, Clos), is sparingly cult. in S. Fla. and Calif.; its velvety fr. is maroon-purple with purplish pulp.

**D. caffra**, Warb. (*Aberia caffra*, Harv. & Sonder). KEI-APPLE. UMKOKOLO. Vigorous glabrous shrub or small tree to 20 ft. high, armed with long stiff sharp thorns: lvs. oblong-obovate, about 2 in. long, often in small clusters at base of thorns, obtuse, entire: fls. greenish and inconspicuous: fr. oblate or nearly round, about 1 in. diam., bright yellow, the yellow juicy pulp surrounding the flattened seeds. S. Afr.

3. **AZARA**, Ruiz & Pav. Evergreen shrubs or small trees with very bitter wood, of more than 20 species in S. Amer., mostly native to Chile, one species occasionally planted for a wall-cover in warm regions.—Lvs. alternate, leathery, short-petioled, with usually 1 of the stipules enlarged and lf.-like: fls. usually bisexual, small, fragrant, in axillary peduncled racemes or clusters, the bracts small; sepals 4–5, rarely 6, persistent; petals 0; stamens numerous, seldom 5 or 10, with 5 glands between stamens and sepals and opposite the latter; ovary superior, 1-celled with many ovules on 2–4 parietal placentæ, the style simple and elongated: fr. a berry which is sometimes dehiscent at apex. (Aza-ra: after J. N. Azara, 1731–1804, Spanish promoter of science, especially botany.)

**A. microphylla**, Hook. f. From 3–12 ft. high: lvs. obovate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, serrate or nearly entire, glabrous and shining, the stipules about half size of lf.: fls. in few-fl. clusters, greenish, with 5 stamens, blooming Feb.–Mar.: berries orange. Chile.

### 113. PASSIFLORACEÆ. PASSION-FLOWER FAMILY

Herbaceous or woody plants, usually climbing by tendrils, of about 18 genera and 350 species in warm and trop. regions, most abundant in S. Amer. and one genus extending north to Pa.; several passifloras are grown for their edible frs. and others as ornamental vines.—Lvs. alternate, usually petioled, simple or lobed, mostly stipulate; tendrils axillary, simple: fls. bisexual or unisexual, regular, solitary or clustered; sepals 3–5, imbricated, often petaloid; petals as many as sepals and alternating with them or sometimes wanting, inserted on throat of calyx, usually free, imbricated, sometimes fringed; corona, or outgrowth of receptacle, usually present, of 1 to several rows, composed of many filaments free or united at base, or tubular and often deeply fringed; stamens usually 5 and alternate with petals, seldom 3–10, the filaments free or monadelphous; ovary superior, often on a gynophore or stalk, 1-celled with 3–5 parietal placentæ bearing several to many ovules, the styles 1–5: fr. a caps. or berry, the seeds with a fleshy aril.

**PASSIFLORA**, L. PASSION-FLOWER. About 300 species mostly native in Amer., a few in Asia and Australia and 1 in Madagascar.—Lvs. entire, digitately lobed or parted, the petioles usually gland-bearing: fls. bisexual, often large and showy, solitary or racemose, mostly axillary, on articulated and often 3-bracted peduncles; stamens united in tube around stalk of ovary, the anthers versatile; styles 3: fr. a many-seeded berry. (Passiflo-ra: *passion-flower*, the parts of the fl. supposed to represent the implements of the crucifixion.)

A. Lvs. not lobed.

B. Floral bracts free.

C. Sts. and branches strongly 4-angled or -winged.

D. Peduncles set in cavity at base of fl.: petiole with 6 glands:

sepals not horned.....

1. *P. quadrangularis*

DD. Peduncles not set in cavity: petiole with 2–4 glands: sepals

with a short horn.....

2. *P. alata*

CC. Sts. and branches terete, not winged.....

3. *P. laurifolia*

BB. Floral bracts connate about the middle.

C. Stipules linear.....

4. *P. maliformis*

CC. Stipules broadly ovate.....

5. *P. ligularis*

AA. Lvs. lobed.

B. Receptacle or tube short.



- c. Petals deep red..... 6. *P. racemosa*  
 cc. Petals white or pink.  
 D. Outer rays of corona about as long as petals: lvs. serrate.  
 E. Fls.  $3\frac{1}{2}$  in. across..... 7. *P. Colvillii*  
 EE. Fls.  $1\frac{1}{2}$ –2 in. across.  
 F. Fr. yellow when ripe..... 8. *P. incarnata*  
 FF. Fr. deep purple when ripe..... 9. *P. edulis*  
 DD. Outer rays of corona distinctly shorter than petals: lvs.  
 entire, or with only few teeth at base in No. 12.  
 E. Lobes of lvs. 5–7..... 10. *P. cærulea*  
 EE. Lobes of lvs. 3.  
 F. St. 4-angled: sepals not ending in spur..... 11. *P. alato-cærulea*  
 FF. St. terete: sepals ending in long spur or tube..... 12. *P. violacea*  
 BB. Receptacle or tube elongated ( $1\frac{1}{2}$  in. or more long).  
 c. Under surface of lvs. glabrous..... 13. *P. Van-Volxemii*  
 cc. Under surface of lvs. pubescent.  
 D. Tube or receptacle of fl. about  $1\frac{1}{2}$  in. long..... 14. *P. manicata*  
 DD. Tube of fl. 4–5 in. long..... 15. *P. mollissima*

1. *P. quadrangularis*, L. GIANT GRANADILLA. Strong glabrous climber with sts. sharply 4-angled and -winged: lvs. entire, ovate or round-ovate, 6–8 in. long, cordate, mucronate at apex, the petiole with 6 glands; stipules large, ovate, acute: fls. about 3 in. across, fragrant, the peduncles set in cavity at base of fl.; sepals green outside, rose-colored within, the crown of white and purple filaments, the outer series longer than the sepals and petals: fr. oblong, 5–10 in. long, greenish-yellow, with edible pulp. Trop. Amer.—There is a form in which the foliage is blotched with yellow.

2. *P. alata*, Dry. Glabrous climber with 4-angled slightly winged sts.: lvs. entire, ovate or oblong-ovate, 4–6 in. long, the margin sometimes slightly undulate, petiole with 2–4 glands; stipules much shorter than petioles: fls. 4–5 in. across, fragrant; sepals green outside and rosy or red inside, bearing a small horn on back; the petals white outside and red within, the crown of numerous red, purple, and white filaments, the outer series longer than petals: fr. ovoid-pointed, 3–5 in. long, yellow, fragrant and edible. Trop. Amer.

3. *P. laurifolia*, L. YELLOW GRANADILLA. WATER-LEMON. JAMAICA-HONEY-SUCKLE. Glabrous climber, the sts. terete: lvs. entire, ovate-oblong or oblong-lanceolate, 3–5 in. long, acute or acuminate, petioles with 2 glands at apex; stipules linear: fls. up to 4 in. across, white with red spots or blotches; sepals with a small horn on back; crown about length of petals, violet with white bands: fr. oblong, about 3 in. long, yellow, edible. Trop. Amer.

4. *P. maliformis*, L. Strong glabrous climber with terete sts.: lvs. entire, ovate or ovate-oblong, 4–7 in. long, acuminate, the petioles with 2–6 glands; stipules linear-subulate: fls. fragrant, white, to 5 in. across, subtended by large ovate bracts united to about middle; crown about as long as petals, variegated red, violet, and white: fr. globose, about 2 in. diam., yellowish-green, edible. Trop. Amer.

5. *P. ligularis*, Juss. SWEET GRANADILLA. Vigorous climber: lvs. entire, ovate, 5–6 in. long, cordate, acuminate, with 6 petiolar glands; stipules ovate-oblong: fls. to 3 in. across, subtended by ovate-oblong bracts united to about the middle; sepals and petals greenish; crown white and red-purple: fr. oval or elliptic, about 3 in. long, orange-brown or purplish, hard-shelled, with edible white pulp. Trop. Amer.

6. *P. racemosa*, Brot. (*P. princeps*, Hort.). Glabrous climber, the sts. terete and grooved: lvs. deeply 3-lobed, 3–5 in. long, thick, truncate or slightly cordate at base, the margins thick and entire, petioles with 2–4 small glands; stipules oblique, shorter than petioles: fls. 3–4 in. across, the cylindrical tube or receptacle swollen at base, with usually 2 peduncles from an axil, becoming racemose at ends of shoots; sepals keeled on the back, ending in a sharp horn; petals shorter than sepals, deep red, wide-spreading; crown somewhat shorter than petals, white and purple: fr. oblong, about 2 in. long, greenish-yellow, 3-grooved. Brazil.

7. *P. Colvillii*, Sweet (*P. incarnata* × *P. cærulea*). St. terete or slightly angular, climbing: lvs. deeply 3–5-parted, light green and slightly pubescent beneath, serrate, the petioles with 2 glands near summit; stipules crescent-shaped: fls.  $3\frac{1}{2}$  in. across; sepals white inside, with keel on back which ends in sharp point; petals white dotted with red-brown; crown about as long as petals, variegated with purple, white and blue. (Named after Mr. Colvill, English nurseryman.)

8. *P. incarnata*, L. WILD PASSION-FLOWER. MAYPOP. Strong perennial vine climbing 20–30 ft., glabrous or nearly so: lvs. deeply 3-lobed, 3–5 in. long, some-

what cordate at base, serrate, the petiole with 2 glands near summit: fls.  $1\frac{1}{2}$ –2 in. across, white; crown purple or pink, as long as or longer than petals: fr. ovoid, about 2 in. long, with 3 sutures, yellow, edible. Va. to Fla. and Tex.

9. *P. edulis*, Sims. PURPLE GRANADILLA. Woody climber with grooved branches: lvs. deeply 3-lobed,  $2\frac{1}{2}$ –5 in. long, cuneate or cordate at base, serrate, the petioles with 2 glands at apex: fls. about 2 in. across; sepals white inside, horned on the back; petals white; crown white, purple at base, about as long as petals: fr. oval, 2–3 in. long, deep purple, the rind hard, edible. Brazil.

10. *P. cærulea*, L. Glabrous and somewhat glaucous slender vine with terete or slightly angled sts.: lvs. deeply divided into 5 lanceolate entire sharp-pointed lobes, the 2 lower ones sometimes again lobed: fls. 3–4 in. across, slightly fragrant; sepals white or pale pink within, with a short horn on back near apex; petals pale pink; crown white, purple at base and apex, distinctly shorter than petals: fr. ovate or subglobose, yellow, about  $1\frac{1}{2}$  in. long. Brazil.—This is the commonest passion-flower grown in greenhouses, and there are many hybrids between this and related species.

11. *P. alato-cærulea*, Lindl. (*P. alata* × *P. cærulea*. *P. Pfordtii*, Hort.). Sts. 4-angled, climbing: lvs. with 3 ovate-lanceolate entire lobes, cordate, the petioles with 2–4 glands: fls. fragrant, about 4 in. across; sepals white inside, revolute at margins; petals pink within, greenish-white outside; crown distinctly shorter than petals, dark-purple at base, bluish in middle and white at tip. Raised at the nursery of Wm. Masters, Canterbury, England.

12. *P. violacea*, Vell. Glabrous climber with terete branches: lvs. with 3 ovate-lanceolate lobes, the margins entire or with only few teeth in bottom of sinus, petioles with 4 glands: fls. about 3–4 in. across; sepals violet inside, ending in a long spur; petals violet; crown distinctly shorter than petals, violet and white. Brazil.

13. *P. Van-Volxemii*, Triana & Planch. (*Tacsonia Van-Volxemii*, Hook.). Climber: lvs. glabrous, cordate-ovate in outline, about 4–5 in. long, deeply divided into 3 lanceolate, acuminate, serrate lobes, petioles with many glands: fls. 4–5 in. or more across, bright red, the cylindrical tube or receptacle  $1\frac{1}{2}$  in. long and swollen at base; crown consisting of an inconspicuous toothed rim: fr. ellipsoid, edible. (Named after M. Van Volxem, who found the plant in Bogota and introduced it into Belgium in 1858.) Colombia.

14. *P. manicata*, Pers. (*Tacsonia manicata*, Juss.). St. nearly terete: lvs. coriaceous, about 4 in. long, pubescent beneath, deeply divided into 3 ovate acute serrate lobes, the petioles with 3–4 glands: fls. brilliant scarlet, about 4 in. across, the tube or receptacle about  $1\frac{1}{2}$  in. long and swollen at base; outer crown of many short blue filaments and the inner consisting of an inflexed membrane: fr. egg-shaped or subglobose, yellowish-green, thick-skinned. Colombia, Ecuador, Peru.

15. *P. mollissima*, Bailey (*Tacsonia mollissima*, HBK.). All parts of plant soft-pubescent except the tube of fl.: st. terete or only slightly angled: lvs. cordate-ovate in outline, 4–5 in. long, deeply divided into 3 ovate-lanceolate serrate lobes, the petioles with 6–10 or more glands: fls. rose-colored, about 3 in. across, the cylindrical tube or receptacle about 4–5 in. long; crown consisting of a short rim: fr. ellipsoidal, yellow, pubescent. Andes.

#### 114. CARICACEÆ. PAPAW FAMILY

Small soft-wooded trees with milky juice, of 2 genera and about 30 species of trop. and subtrop. Amer. and 1 in Afr., the papaya widely grown for its edible melon-like fr.—Trunks straight and palm-like, rarely branched, with a terminal crown of large palmately-lobed lvs.: fls. usually unisexual (dicæious), in few-fld. racemes; calyx very small; petals 5, in the staminate fls. connate into long tube, nearly distinct in pistillate fls.; stamens 10, in 2 series, inserted on throat of corolla, the filaments short; ovary superior, 1-celled, bearing many ovules on 5 placentæ, or falsely 5-celled; stigmas 5, simple or irregularly branched: fr. a large fleshy berry.

**CARICA**, L. About 25 species native in trop. and subtrop. Amer., the papaya sometimes grown in greenhouses as a curiosity and extensively planted in the tropics and warm countries for the edible fr., from which also commercial

papain is extracted.—Technical characters as for the family. (Car-ica: named probably from certain resemblance to the fig, *Ficus carica*, which was erroneously supposed to come from Caria.)

**C. Papaya**, L. (*Papaya Carica*, Gaertn.). PAPAÑA. PAWPAW. Tree to 25 ft. high, the trunk with no lateral branches but sometimes dividing into several erect sts. bearing heads of lvs.: lvs. sometimes 2 ft. across, nearly orbicular in outline, usually palmately and deeply 7-lobed, each lobe pinnately lobed, pale or glaucous beneath; petioles hollow, 2 ft. or more long: staminate fls. sessile, in slender racemes often 3 ft. long, funnel-shaped, about 1 in. long, corolla yellow, the lanceolate lobes about half as long as tube; pistillate fls. nearly sessile, solitary or in few-fl. corymbs, about 1 in. long, corolla yellow, the 5 distinct petals lanceolate and twisted: fr. oblong or nearly spherical, yellow or orange, 3–20 in. long, the yellow thick flesh inclosing a 5-angled cavity on the walls of which are borne blackish seeds. Trop. Amer.

### 115. LOASACEÆ. LOASA FAMILY

Erect or climbing herbs or rarely shrubs and small trees, of 13 genera and about 200 species native in S. Amer. and a few in W. N. Amer., furnishing some flower-garden subjects.—Plants with peculiar hairs, some stinging, some barbed: lvs. opposite or alternate, very diverse, usually exstipulate: fls. regular, bisexual, the infl. various; receptacle or calyx-tube adnate to the ovary, the sepals commonly 5, seldom 4 or 6–7, imbricated or contorted, persistent; petals of the same number and alternate with sepals, inserted inside the calyx on the receptacle, flat or hooded, usually free; stamens mostly many, seldom 5 or 10 or 2 by abortion, inserted with petals, sometimes in fascicles opposite the petals, staminodia often present which may be filiform or petaloid; ovary usually inferior and 1-celled, with 1 to many ovules borne on 3–5 parietal placentæ, the style entire or 2–3-parted: fr. a caps., dehiscent or indehiscent.

Petals hooded, alternating with as many hooded scales.

Caps. dehiscent by 3–5 valves at apex, not twisted. . . . . 1. LOASA

Caps. spirally dehiscent by 3–5 valves, remaining closed at apex. . . . . 2. CAIOPHORA

Petals not hooded, scales 0. . . . . 3. MENTZELIA

**1. LOASA**, Adans. Over 80 species of herbs or subshrubs, rarely climbing, armed with stinging hairs, native from Mex. to Patagonia.—Lvs. opposite or alternate, entire, lobed or decompound: fls. solitary in the axils, or in racemes or cymes; petals 5, hooded, spreading or nearly erect, alternating with 5 hooded nectar-scales bearing on the back 2–3 bristles and with 2 filiform staminodia opposite each scale; stamens numerous, the slender filaments in fascicles opposite the petals; ovary 1-celled with many ovules on the 3–5 parietal placentæ: caps. terete or ribbed, rarely somewhat twisted, dehiscent at apex by 3–5 valves between the persistent sepals. (Loa-sa: native S. American name.)

**L. vulcanica**, André (*L. Wallisii*, Regel). Erect bushy annual 2–3 ft. high: lvs. palmately 3–5-lobed, 3–6 in. across, petioled, the ovate or ovate-lanceolate lobes serrate and long-petioled: fls. in 6–8-fl. leafy racemes, the floral lvs. sessile, white, about  $1\frac{1}{2}$  in. across, the scales deep yellow barred with red and white: caps. about  $\frac{3}{4}$  in. long. Ecuador, Colombia.

**2. CAIOPHORA**, Presl. Annual or perennial herbs, prostrate, erect or climbing, usually with stinging hairs; about 50 species in S. Amer.—Very similar to Loasa and differing principally in the caps. which is spirally twisted and dehisces longitudinally by 3–5 valves, rarely 6–10, but remains closed at apex: lvs. opposite. (Caioph-ora: from Greek for *burning* and *to bear*, referring to the stinging hairs.)

**C. lateritia**, Benth. (*Blumenbachia lateritia*, Britt.). Slender climbing annual, the sts. 10–20 ft. long: lvs. long-petioled, 1–3 in. long, pinnate, the segms. toothed or lobed: fls. on very long peduncles, 1–2 in. across, orange-red; scales yellowish-green, their segms. meeting over top of stigma: caps. 2–3 in. long, cylindrical. S. Amer.

3. **MENTZELIA**, L. About 50 species distributed in trop. and subtrop. Amer. and a few in W. U. S.; annual or perennial herbs, shrubs or trees, usually with barbed but not stinging hairs.—Lvs. alternate, rarely opposite, sessile or petioled, entire, lobed or pinnatifid: fls. solitary or in racemes or cymes, subtended by leafy bracts; petals 5, free or connate at base with each other and with the stamens; stamens numerous, free or in fascicles opposite the petals, sometimes the outer stamens sterile and petaloid; style simple or 4-cleft: caps. dehiscent at summit by 3–6 valves. (Mentzelia: after Christian Mentzel, 1622–1701, German botanist.)

**M. Lindleyi**, Torr. & Gray (*Bartonia aurea*, Lindl.). Straggling annual 1–4 ft. high, with simple or branched sts.: lvs. narrow-lanceolate to ovate, 2–5 in. or more long, coarsely toothed or pinnatifid: fls.  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, bright yellow, fragrant, opening in evening and remaining until following morning; petals rounded at apex but with an abrupt short point; anthers spiral: caps. club-shaped,  $1-1\frac{1}{4}$  in. long. (Named for John Lindley, 1799–1865, English horticulturist and botanist.) Calif.

## 116. BEGONIACEÆ. BEGONIA FAMILY

Five genera are recognized, but all except 5 or 6 of the more than 400 species are in the genus *Begonia*, and this genus is the only one interesting the general cultivator, yielding many kinds of glasshouse ornamentals and abounding in cultivars; native in many trop. countries.—Monœcious herbs or seldom shrubby, mostly perennial, usually somewhat succulent and with swollen nodes: roots rhizomatous, tuberous or fibrous: lvs. alternate and commonly oblique at base: fls. with parts mostly regular in each series except that one wing of the ovary may be strongly developed, disposed in clusters bearing staminate and pistillate blooms of which the former usually open first; perianth of staminate fls. commonly of 2 petals and 2 petal-like sepals, the two series often unlike; stamens many, with filaments distinct or connate; perianth of pistillate fls. of 2–5 or more parts; ovary inferior, 2–3-celled, angled or winged, styles 3 with prominent usually bent or twisted stigmas, ovules numerous: fr. usually a caps., with many fine seeds.

**BEGONIA**, L. Character of the family; distinguished from the other 3 genera largely by the number, position, and distinctness of the perianth-parts and attachment of the ovary; the genus yields many choice foliage pot-plants and also a good number with showy bloom in white, coral-red, rose, yellow, and other shades; the present tendency with gardeners is to restrict the number of species in cult., and to develop hort. races of the *B. Rex* foliage type, the hybridized tuberous kinds, and the very floriferous *B. semperflorens* group. Many of the plants in cult. cannot be referred to any clear specific type, and group-names are needed. While the number of species in common cult. is now limited, many outlying kinds may be found in special collections. There is no vernacular name for the group, except *Begonia* itself, although the term *Elephants Ear* is sometimes applied to those with large lop-sided lvs., and *Beefsteak-Geranium* to the red-leaved kinds with heavy hanging foliage of the *Rex* group. (*Bego-nia*: Michel Bignon, 1638–1710, promoter of botany, supt. at St. Domingo.)

A. Begonias with roots fibrous or essentially so (or the rootstocks, if present, mostly subterranean and not prominent).

B. Species small and succulent, sts. not becoming hard or woody and little branched except at base.

c. Lvs. not lobed, glossy..... 1. *B. semperflorens*

cc. Lvs. lobed, hairy..... 2. *B. Schmidtiana*

BB. Species developing woody or somewhat shrubby usually much-branched often tall sts.

c. Lvs. about  $\frac{1}{2}$  in. long, distichous, serrate or 3-toothed at apex... 3. *B. foliosa*

cc. Lvs. otherwise, much larger.



- D. Plant slender and glabrous: lvs. many and small, usually not more than 1 in. across (partial exception in No. 7).
- E. Fls. white or greenish-white.
- F. Lf. not spotted..... 4. *B. acutifolia*
- FF. Lf. spotted white..... 5. *B. albo-picta*
- EE. Fls. pink or red.
- F. Size of lvs. small, usually not exceeding 1½ in. long.... 6. *B. fuchsioides*
- FF. Size of lvs. larger and prominently double-serrate, 2-4 in. long..... 7. *B. Sandersonii*
- DD. Plant stiff, white-scurfy..... 8. *B. incana*
- DDD. Plant large and large-leaved, usually distinctly bushy.
- E. Whole plant more or less hairy or rough.
- F. Fls. white.
- G. Lf. broad-ovate or broader, heavy..... 9. *B. Scharffiana*
- GG. Lf. ovate-lanceolate, not thick or heavy..... 10. *B. Duchartrei*
- FF. Fls. rose or rose-tinted.
- G. Lf. not lobed..... 11. *B. Haageana*
- GG. Lf. lobed.
- H. Upper surface purplish with broad midway band of green..... 12. *B. laciniata*
- HH. Upper surface metallic green..... 13. *B. metallica*
- EE. Whole plant glabrous or becoming so (or retaining sparse hairiness on lvs.; more or less exceptions in Nos. 19 and 21).
- F. Lvs. entire, very thick, red beneath, somewhat peltate. 14. *B. sanguinea*
- FF. Lvs. various, undulate or serrate, but not really peltate.
- G. Habit climbing, creeping or trailing: lvs. without basal sinus..... 15. *B. glaucophylla*
- GG. Habit quite otherwise, erect or bushy.
- H. Lf. with strong basal or petiolar sinus and radiating ribs.
- I. Blade with large circular white spots..... 16. *B. maculata*
- II. Blade not white-spotted.
- J. Fls. pink or white..... 17. *B. nitida*
- JJ. Fls. deep coral-red..... 18. *B. coccinea*
- HH. Lf. without basal sinus; venation pinnate..... 19. *B. ulmifolia*
- FFF. Lvs. strongly angled, notched, incised or lobed.
- G. Infl. peduncled.
- H. Fls. small, white..... 20. *B. dichotoma*
- HH. Fls. showy, tinted or deeply colored.
- I. Habit of plant proliferous—producing offsets on lvs., petioles, and sts..... 21. *B. phyllomanica*
- II. Habit not proliferous.
- J. Lf. thickly white-dotted..... 22. *B. argenteo-guttata*
- JJ. Lf. not spotted.
- K. Wings of caps. unequal, one of them strongly developed..... 23. *B. incarnata*
- KK. Wings 3 and practically equal..... 24. *B. nigricans*
- GG. Infl. practically sessile; fls. large, white or greenish.
- H. Basal sinus margined by nerves destitute of lf.-tissue: lvs. not spotted..... 25. *B. palmaris*
- HH. Basal sinus not so margined: lvs. spotted..... 26. *B. olbia*
- AA. Begonias with prominent horizontal or creeping shaggy sts. or rhizomes that frequently extend over the pot and from which the lvs. and peduncles arise: sometimes known as acaulescent species.
- B. Lvs. essentially plain green.
- C. Blade very broad or circular in outline, prominently palmately lobed, cleft or divided.
- D. Lobes 5-9 and narrow, nearly or quite to middle of blade or beyond..... 27. *B. heracleifolia*
- DD. Lobes triangular, one-third or less the depth of blade..... 28. *B. riciniifolia*
- CC. Blade lanceolate to ovate or in some cases orbicular, not deeply lobed, perhaps entire and sometimes peltate.
- D. Lf. about centrally peltate..... 29. *B. nelumbifolia*
- DD. Lf. not peltate.
- E. Shape of lf. obliquely cordate-ovate.
- F. Margins entire, repand, or finely serrulate..... 30. *B. conchafolia*
- FF. Margins dentate..... 31. *B. manicata*
- EE. Shape orbicular or nearly so, entire (unless crested), prominently ciliate on margin..... 32. *B. Feastii*
- BB. Lvs. illustrated, being highly colored above or below, blotched, banded, or blistered.
- C. Margin of lf. continuous, without deep or long-pointed notches or lobes. (Nos. 30, 31, 32 may be sought here.)
- D. Blade metallic-green zoned with silvery-gray midway between margin and center..... 33. *B. Rex*
- DD. Blade variously colored, blotched or marbled..... 34. *B. Rex-cultorum*

- DDD. Blade brownish-green, with bands of lighter green along the veins.....35. *B. imperialis*  
 CC. Margin angled and shallowly lobed.  
   D. Blade speckled gray.....36. *B. speculata*  
   DD. Blade with irregular dark brown spots.....37. *B. rubellina*  
 AAA. Begonias with tuberous or bulbous roots.  
   B. Lvs. centrally peltate.....38. *B. socotrana*  
   BB. Lvs. not so.  
     C. Fls. small and simple, 1 in. or less across: lvs. small, lobed, notched or angled.....39. *B. Dregei*  
     CC. Fls. much developed, usually  $1\frac{1}{2}$  in. or more across: lvs. usually 4 in. or more long.  
       D. Blossoms light yellow, single.....40. *B. Pearcei*  
       DD. Blossoms varicolored, mostly double.....41. *B. tuberhybrida*

1. *B. semperflorens*, Link & Otto. The prevailing type of florists' flowering begonias, now in many races and forms, some of them used for bedding: glabrous and somewhat succulent, sts. little branching except from base, 6-18 in. high, green or reddish: lvs. glossy, ovate or oval to broad-oval, 2-4 in. long, more or less oblique at base, finely serrulate and with ciliate margins, green but usually tinged red on ribs; stipules large and dry: fls. rose-red to whitish, on few-fl. axillary peduncles, the staminate with 4 parts an in. or less across and the pistillate smaller and with 5 parts: caps. green with prominent red-tinged wings. Brazil.—With this species belong such hort. kinds as Vernon, Triomphe de Lorraine, Chatelaine, Henry Martin, Gloire de Louveciennes, Carrierei, Erfordii, the two last being supposed hybrids with *B. Schmidtiana*; some races are white-fl. *Gigantea rosea* is a sterile *semperflorens* hybrid of large size, so distinct as to be usually not classed with this group by cultivators.

2. *B. Schmidtiana*, Regel. Low, 1 ft. or less, but often somewhat woody at base, sts. red-tinged, hairy: lvs. ovate-acuminate, about 2-3 in. long, angled and sometimes shallowly lobed, toothed, hairy on margins and underneath, reddish on under surface: fls. white and tinted rose, small but many. Brazil; named for Mr. Schmidt, of Haage & Schmidt, Erfurt, Germany, seedsmen and nurserymen.

3. *B. foliosa*, HBK. Small glabrous profusely small-leaved begonia becoming shrubby at base, the sts. diffuse or drooping: lvs. about  $\frac{1}{2}$  in. long, distichous, glossy-green, close together and numerous, oblong, serrulate, the scarious brown stipules prominent along the branchlets: fls. white or tinged rose, about  $\frac{1}{4}$  in. across, mostly solitary on slender hanging pedicels, the parts 4: caps. very unequally winged. Colombia; blossoms when small, a good basket and border species.

4. *B. acutifolia*, Jacq. (*B. acuminata*, Dry.). Slender, 3-4 ft., subshrubby but succulent, sts. glabrous, branching: lvs. narrowly oblong-acuminate to ovate-acuminate, 2-3 in. long, oblique at base, serrate and ciliate with fugacious hairs, glabrous or with sparse hairs on veins beneath; stipules prominent and dry: fls. small and white, about 1 in. across, 3-5 on a peduncle and slender-pedicelled: caps. truncate at top and rounded at base, the large wing triangular-ovate. Jamaica.

5. *B. albo-picta*, Hort. Much-branched shrubby compact begonia, grown for its numerous silvery-spotted glossy-green foliage: lvs. elliptic-lanceolate, rather small: fls. rather small, greenish-white; staminate with 2 narrow and 2 broad parts, pistillate with 5 nearly equal parts. Brazil.

6. *B. fuchsoides*, Hook. Glabrous erect branching plant 2-3 ft. high, with short not prominent rootstock and tumid nodes: lvs. many, ovate, 1- $1\frac{1}{2}$  in. long, finely serrate, often tinged red; stipules scarious: fls. scarlet and drooping like fuchsias,  $\frac{3}{4}$  in. or less long, on forking peduncles; staminate perianth of 4 parts, pistillate of 5; ovary prominent. Mex.

7. *B. Sandersonii*, Hort. Of garden origin, hybrid apparently from *B. fuchsoides*, probably with some form of the *B. semperflorens* group: glabrous, nearly or quite erect: lvs. ovate-acuminate,  $1\frac{1}{2}$ -3 or 4 in. long, sharply double-serrate, dark green: fls. rose or rose-scarlet, drooping, 1 in. or less long, much like those of No. 6, freely produced.—May be the same as *B. Digswelliana*, Hort.

8. *B. incana*, Lindl. (*B. peltata*, Hort., not Hassk.). Soft rather succulent plant white scurfy-tomentose on sts. and foliage; st. erect, mostly simple, 1-2 ft.: lvs. broad-ovate to orbicular-ovate, 4-9 in. long, oblique, peltate one-third or more from the margin, and strongly ribbed from the attachment, entire or somewhat repand: fls. in large forked clusters on long peduncles, white, petals and ovary white-pilose; staminate fls. 1 in. across with 2 large rounded parts and 2 narrow oblong parts; pistillate fls. with smaller petals, 2 large and 2 very small. Brazil.

9. *B. Scharffiana*, Regel. Robust hairy herb, 1-3 ft., making heavy and handsome radical large hairy broad-ovate oblique abruptly strong-pointed lvs. 6-8 in.

long, olive-green above and bright red beneath; stipules large and prominent: fls. large, in heavy long-peduncled clusters, waxy-white with prominent red hairs. Brazil; named for the discoverer, D. Scharff.

10. *B. Duchartrei*, André. Hybrid from *B. Scharffiana* with branched hairy st. 2-3 ft. and more high: lvs. ovate-lanceolate, long-acuminate, 5-8 in. long, rather thin, dentate, hairy, particularly on the violet-red nerves, green above and reddish beneath; stipules large, oval-lanceolate: fls. in rather compact long-peduncled clusters, large, waxy-white with a few red hairs; staminate  $1\frac{1}{2}$  in. across, with 4 suborbicular parts; pistillate somewhat larger, with 5 oval-oblong parts. Dedicated about 1892 to Mons. Duchartre, secretary of the National Hort. Society of France.

11. *B. Haageana*, Wats. Tall and hairy shrubby branching plant: lvs. ovate-cordate and acuminate, oblique at base, 4-10 in. long, rather heavy, margin undulate and dentate, red-nerved above: fls. large, in very heavy drooping or hanging clusters that become 1 ft. broad, rose-pink; staminate perianth  $2\frac{1}{2}$  in. across, the parts 4, of which 2 are expanded and rounded and 2 narrow spatulate; pistillate perianth smaller, of 5 nearly equal parts; ovary with long red hairs. S. Brazil; bears the name of one of the nursery firm of Erfurt, Haage & Schmidt.

12. *B. laciniata*, Roxb. (*B. Boweringiana*, Champ.). More or less diffuse or straggling plant to 2 ft. high, with green pubescent branches: lvs. broadly cordate-ovate with oblique base, 5-7 or 8 in. long, nearly or quite glabrous but ciliate-serrulate on the margins, the outline somewhat angled or even continuous to sharp-lobed or even lacinate, purplish-black with broad green band midway: fls. white and few on a peduncle; staminate about 2 in. across, with 2 large and 2 medium-sized expanded parts; pistillate smaller, with 5 erect parts; ovary hairy. India to China.

13. *B. metallica*, L. Smith. Erect shaggy-hairy plant, 3-4 ft., branching: lvs. obliquely ovate, more or less cordate or subcordate at base, 3-6 in. long, lobed or deeply angled, with irregularly sinuate-serrate margins, the upper surface green but shaded and feathered with metallic tints and sparsely hairy, under surface lighter colored but shaded along the veins which are prominently hairy: fls. in peduncled clusters, blush-white or light rose, red-hairy; staminate  $1\frac{1}{2}$  in. across, with 2 very large nearly orbicular parts and very small oblong ones. Brazil.—*B. Thurstonii*, Hort., a reputed hybrid between *B. metallica* and *B. sanguinea*, has the habit of the former but with glabrous obliquely orbicular-acuminate lvs. red on under surface; originated with C. Thurston, Paterson, N. J.

14. *B. sanguinea*, Raddi. Very smooth and shining plant, the sts. several, more or less branched, red: lvs. thick, mostly near the base, obliquely cordate-ovate, 3-6 in. long, slightly peltate, very abruptly pointed, unlobed and entire, glabrous both sides, rich green above, brilliant blood-red beneath: fls. small, white, on long slender red peduncles; staminate about  $\frac{3}{4}$  in. across, of 2 large rounded and 2 small oblong parts. Brazil; prized for its mass of heavy persistent very red-bottomed foliage.

15. *B. glaucophylla*, Hook. f. Glabrous rather slender begonia with pendulous or climbing white-spotted sts. and glaucous foliage: lvs. rather thick, oblong-lanceolate to narrowly oblong-ovate, acuminate, 3-5 in. long, pinnately-nerved, base regular, margin more or less sinuate, green both surfaces and glaucous: fls. rose-color, in ample mostly nodding short-peduncled clusters; staminate 1 in. or more across, with 2 large and 2 smaller parts; pistillate with 4 similar parts and a large ovary with 1 or 2 wings strongly developed. Probably Brazil.—The more scandent forms are often cult. as var. *scandens* as rafter plants in greenhouses. *B. scandens*, Sw., of the American tropics, with small white fls. and crenate-dentate lvs., is not to be expected in cult.

16. *B. maculata*, Raddi (*B. argyrostigma*, Fisch.). Very smooth and glabrous, erect or straggling, 2-4 ft., and sometimes much more, branched: lvs. thick, obliquely oblong to oblong-ovate with a cordate sinus, 4-8 in. long, nearly or quite blunt, entire but margins undulate, red beneath, green with many circular white dots above: fls. pale rose or white, in short-peduncled hanging clusters; staminate about 1 in. across, with 2 large and 2 small parts; pistillate with 5 erect equal parts and large winged ovary. Brazil; cult. in several races varying in the abundance and size of lf-spots, as well as in stature and habit.

17. *B. nitida*, Dry. Glabrous erect branching plant 3-5 ft. high, with lively green glossy foliage: lvs. thick, reniform-ovate, 4-6 in. long, very oblique at base, prominently but rather abruptly pointed, irregularly crenate-dentate: fls. pale pink or rose, in large diffuse long-peduncled clusters; staminate  $1\frac{1}{2}$  in. across, with 2 large and 2 small parts; pistillate small, with 5 parts. Jamaica.—Var. *odorata*, Hort., is a kind with smaller clear white very fragrant fls.

18. *B. coccinea*, Hook. (*B. rubra*, Hort.). Glabrous and tall branching plant to 3 or 4 ft. but often blooming freely when 1 ft. or less high: lvs. thick and stiff, very obliquely oblong to oblong-ovate, 4-6 in. long, the short petiole inserted in a sinus one-fourth or one-third the distance from the base, pointed, unlobed, margins undulate and sometimes obscurely toothed and red-bordered, glabrous, green above and reddish beneath: fls. brilliant coral-red, in drooping forking clusters on red peduncles, long-lasting; staminate fls. nearly 1 in. across, with 2 large and 2 smaller parts; pistillate more showy because of the brilliant 3-winged ovary which is  $\frac{3}{4}$ -1 in. and more long. Brazil.—Derivatives of this species, in whole or in part, are in cult. for the very showy hanging coral-red pistillate fls., and sometimes for white-spotted foliage. Among these are President Carnot and Lucerna.

19. *B. ulmifolia*, HBK. Slender branching shaggy-hairy, becoming nearly or quite glabrous, sts. 1-2 ft., more or less angled, the large scarious stipules prominent: lvs. elm-like, ovate-oblong, 3-5 in. long, unequal at base, abruptly short-pointed, conspicuously double-serrate, strongly pinnate-veined from the midrib, with scattered hairs above and below: fls. white and small but profusely borne in peduncled clusters; staminate of 2 or 4 similar parts, about 1 in. across. Colombia.

20. *B. dichotoma*, Jacq. Strong quick-growing upright tall glabrous branching plant to 2-3 ft., with green thick st. and very long-petioled lvs. that are thin and lively green: lvs. nearly orbicular in outline to obliquely ovate, 3-12 in. longest diam., shallowly cordate, with several very broad pointed angles and serrulate margins, palminerved, sometimes slightly hairy on veins beneath: fls. many, small and white, in long-peduncled dichotomous clusters, about  $\frac{1}{2}$  in. across, with 2 large and 2 small parts. Venezuela.

21. *B. phyllomaniaca*, Mart. Stout mostly hairy and shaggy, with erect branching thick st., producing many buds and leafy growths (whence the name *phyllomaniaca*, "leaf-crazy") from sts., blades, and petioles: lvs. narrowly and obliquely cordate-ovate and very long-acuminate, 4-6 or 7 in. long, the sinus closed and blade semi-peltate, shallowly and acutely side-lobed and -toothed, the margins ciliate-serrate, green both sides: fls. pale pink, in hanging short-peduncled clusters; staminate about  $\frac{3}{4}$  in. across, with 2 large and 2 small parts; pistillate larger, with 4 parts and very large winged ovary. Brazil.

22. *B. argenteo-guttata*, Lemoine. Of garden origin, common, said to be the issue of *B. albo-picta* and *B. olbia*: marked by the profusely white-speckled foliage: strong glabrous branching plant, 2-4 ft.: lvs. ovate-acuminate, 4-6 in. long, oblique but only subcordate at base, angle-notched or -toothed, the margin finely serrulate: fls. slender-pedicelled, in short-peduncled axillary clusters, white tinged pink, variable in size; staminate about 1 in. across, with 2 very broad and 2 narrow parts; ovary obovate, broad-winged.

23. *B. incarnata*, Link & Otto. Glabrous and erect branching plant, 2-3 ft.: lvs. oblong-ovate to ovate in outline, 4-10 in. long, oblique with narrow sinus, acuminate, variously notched, the margins with bristly or hairy serratures, reddish-green beneath, green above and more or less marked or feathered along veins: fls. many, in hanging long-peduncled clusters, rose-colored; staminate  $1\frac{1}{2}$  in. across, with 2 broad and 2 narrow parts; pistillate with 5 equal parts and large winged ovary. Mex.; runs into forms in cult.

24. *B. nigricans*, Bailey (*B. subpeltata nigricans*, Hort., not *B. subpeltata*, Wight). Erect, glabrous, branching, 2-3 ft.: lvs. ovate in outline, acuminate, 4-9 in. long, with deep basal sinus that is sometimes closed by overlapping of the lobes as if the blade were peltate, irregularly angled-toothed all the way around, the margins bristly serrate, very red beneath, dark silvery-green and more or less dark-marked above and slightly hairy, the hairs sometimes dark red, sometimes becoming bronzy: fls. rose-tinted, in forking peduncled clusters; pistillate about 1 in. across, with 5 nearly equal parts and 3 similar wings. Of hort. origin.

25. *B. palmaris*, A. DC. Erect and glabrous but shaggy with dry deciduous stipules, 1-3 ft., more or less branched: lvs. obliquely reniform-ovate, 4-10 in. total length, with about 3 triangular-ovate acute main lobes extending to the middle or less of the blade, and intermediate acute lobes and teeth with serrulate margins between, more or less sparsely hairy, olive-green above and reddish beneath, not spotted but with darker palmate ribs; basal sinus broad, margined for a short distance above with lateral ribs that bear no lf.-tissue on the under side: fls. in sessile clusters but each fl. on a slender pedicel and covered or hidden by the foliage, white, the petals serrate; pistillate  $1\frac{1}{2}$  in. or more across, with very large 3-winged ovary. Brazil; sometimes confused with No. 26.

26. *B. olbia*, Kerchove. St. short, erect, more or less branched, succulent: lvs. on erect petioles, obliquely ovate in outline, 3-4 in. and more long, 5-nerved,



somewhat bullate, shallowly angle-lobed and the margins irregularly dentate, pointed, the basal sinus rather narrow and not bordered with naked ribs, the under surface deep red, upper surface reddish-hairy and very dark bronzy green and sprinkled with small white spots (the illustration of the lvs. gives rise to the name "olbia," from Greek *olbios*, rich): fls. white, drooping, in small axillary short clusters. Brazil.

27. *B. heracleifolia*, Cham. & Schlecht. St. a short thick rhizome: long petioles and peduncles variously shaggy-hairy, the latter ascending 2-4 ft. and branching at the top and bearing large spreading bracts at the forks: lvs. orbicular in general outline, 6-12 in. or more across, with 5-9 narrow notched and dentate acute lobes that extend to the middle of the blade or beyond, ciliate on margins, dark green above and lighter beneath: fls. white or rose-tinted; staminate  $\frac{1}{2}$ -1 in. across, with 2 rounded petals; pistillate of similar size, with 2 petals and a short ovary with mostly 1 developed wing. Mex.; runs into several forms, varying in hairiness and in the color of foliage, sometimes with barred or maculate lvs.

28. *B. ricinifolia*, A. Dietr. Hybrid issue of *B. heracleifolia*: lvs. with short triangular lobes extending not nearly half the depth of the blade, bronzy-green with ciliate margins: fls. many, rose-pink, on tall peduncles.—There are variants of it.

29. *B. nelumbifolia*, Cham. & Schlecht. (*B. macrophylla*, Hort.). A commanding plant with rhizome thick and short, parts more or less hairy, but often becoming nearly glabrous: lvs. large, nearly orbicular to round-ovate, 8-18 in. long, peltate and with 7-9 main nerves, abruptly short-pointed, not lobed, margins ciliate-serrulate and with points at end of nerves, green both sides, hairy on the nerves beneath and sometimes sparsely so above, the petioles long and upstanding and loosely hairy or glabrous: fls. many and small, in a diffuse cyme on peduncles surpassing the lvs., white or pinkish,  $\frac{1}{2}$  in. or less across; ovary small, with 1 wing developed. Mex.

30. *B. conchæfolia*, A. Dietr. (*B. Warszewiczii*, Hort.). Rhizome short, thick and creeping: lvs. ovate-cordate, 4-6 in. long, apparently peltate from the overlapping basal lobes, unlobed, margins more or less repand and somewhat serrulate and ciliate, green and smooth above, reddish and rusty-hairy beneath particularly along the veins: fls. pink to nearly white, fragrant, on peduncles 1 ft. or so long: 1 wing of caps. long. Cent. Amer.

31. *B. manicata*, Cels. Rhizome or st. short and succulent, and plant glabrous except on lvs. and top of petioles: lvs. fleshy, obliquely short-ovate, 4-8 in. long, abruptly short-pointed, the 5-7 ribs thick, sinuate-dentate and margins strongly ciliate, shining light green above and reddish beneath, the ribs and upper part of petiole bearing hair-like scales: fls. on peduncles 1 ft. or more high and overtopping the foliage, pink, small, the cymes open and forking; petals 2; staminate about  $\frac{1}{2}$  in. across, with the parts narrow and divergent; ovary winged all around. Mex.

32. *B. Feastii*, Hort. Hybrid derivative from *B. manicata*, introduced by John Feast, Baltimore, before 1880 and still in cult.: lvs. nearly orbicular, fleshy, bases close or overlapping as if blade were peltate, short-petioled so that the foliage is close to the pot, 4-6 in. long, more or less ciliate on margin, green above with bronzy luster and reddish beneath, rounder and margins more continuous than in No. 31: fls. light pink, standing high above the foliage.—A form (*B. Bunchii*, Hort.) has crested or crinkled and frilled lvs.

33. *B. Rex*, Putz. Stock thick, mostly subterranean, from which rise the lvs. and peduncles in clusters as if from a crown: lf.-blade 8-12 in. long, hanging nearly perpendicular on a hairy petiole of similar length, ovate, abruptly pointed, oblique, with a closed or overlapped sinus about one-fourth distance from base, unlobed, margin sinuate-dentate and surface puckered or blistered (bullate), reddish beneath and hairy on veins, deep metallic-green above with an irregular zone of silvery-white about 1 in. wide all around and about midway between margin and center, outside of which the surface is tinged purple: fls. pale rose, few in dichotomous cymes surpassing the foliage; staminate about 2 in. across, of 2 cordate-ovate and 2 oblong somewhat smaller parts; pistillate much smaller, with 5 nearly equal parts, ovary with 1 extended wing. Assam; little known in cult.

34. *B. Rex-cultorum*, Bailey. The *Rex* begonias of cultivators, derivatives from No. 33 by hybridization with other species and perhaps by mutation, now representing an important class of plants with illustrated foliage, including many named vars.: distinguished by lvs. unlobed although in some vars. with angle-points and frequently sinuate, and with a wide variety of markings different from those of *B. Rex*, usually variously shaded, blotched and marbled in many tints;

they have the Rex habit of a declined or hanging shield-like lf.-blade facing outward, the tip often nearly touching the ground.

35. *B. imperialis*, Lem. Low condensed green hairy plant, sometimes with a very short herbaceous st., but lvs. and peduncles essentially basal: lvs. cordate-ovate, 2-6 in. long, short-petioled, the base regular or oblique, point short and abrupt, unlobed, margins serrulate, alveolate and very hairy and brown-green beneath, rich green and pustulate above and velvety with many hairs, the regions along the veins light bright green: fls. small, white, often appearing when the plant is very small and not equaling the lvs. but eventually often equaling the short foliage; staminate 2-petalled, about  $\frac{1}{2}$  in. across, hairy; pistillate smaller, with 1 triangular wing of ovary most developed. Mex.; commonly known in trade as Otto Foerster.—Var. *smaragdina*, Lem., has lvs. all green, lacking the feathered veins.

36. *B. speculata*, Hort. Rhizome short and thick: lvs. broad-ovate to orbicular-ovate in outline, 4-8 in. longest way, cordate or subcordate, with an acuminate apex, lobes one-fourth to one-half depth of blade into sharp triangular lobes, on long slender hairy petioles, sparsely hairy and ciliate, dull green speckled gray, reddish beneath and with prominent ribs: peduncle long, bearing pink-white dipetalous fls., the staminate about 1 in. across: caps. with small red spots. Hort. hybrid; makes a good large specimen.

37. *B. rubellina*, Bailey (*B. rubella*, Hort., not Don). Much like No. 36, but large lvs. spattered with irregular dark brown spots. Garden origin.

38. *B. socotrana*, Hook. f. St. annual, erect and succulent, more or less hairy and somewhat branched, from a cluster of bulb-like bodies composed of scales: lvs. orbicular, centrally peltate, 4-7 in. across, with depressed center and rolled or recurved scalloped margin: fls. showy, rose-pink, in a forking small cluster on long bracted peduncle; staminate 2 in. and more across, of 4 nearly equal parts: pistillate somewhat smaller, of 6 similar parts, the ovary with 1 narrow wing. Isl. of Socotra, south of Arabia; apparently not much cult. but entering into such types as Gloire de Sceaux, Gloire de Lorraine, Cincinnati.

39. *B. Dregei*, Otto & Dietr. St. soft and succulent, glabrous, red, 1-3 ft., annual from a fleshy irregular tuber: lvs. ovate to rhombic-ovate, about 3 in. longest way, thin, long-petioled, truncate to cordate at base, mostly acuminate, angled and more or less indefinitely lobed, dentate, green, glabrous, digitately ribbed with veins reddish beneath: fls. white, few on rather short axillary peduncles; staminate 1 in. across, with commonly 2 large broad petals; pistillate smaller, with 5 unequal petals, the ovary bearing 3 broad unequal wings. S. Afr.; long ago collected near Port Natal by Drege, apparently not frequent in cult.—Var. *Macbethii*, Bailey (*B. Macbethii*, Hort.). Mostly a smaller and more slender plant than *B. Dregei* itself and passing for it in cult., growing rapidly; glabrous, 1-1 $\frac{1}{2}$  ft.: lvs. smaller, mostly not exceeding 2 in. longest way, deeply notched-lobed (sometimes to more than half the depth), the margins with few angle-teeth: fls. white, smaller, the staminate  $\frac{3}{4}$  in. or less across.

40. *B. Pearcei*, Hook. f. About 1 ft. high, from a tuber, sts. lf.-bearing, branching, pubescent, and succulent: lvs. obliquely ovate-acuminate, 4-6 in. long, cordate, irregularly and doubly crenate-serrate, rich green and glabrous above, dull red beneath except the green veins, lightly hairy: peduncles about 2-fld. and standing above the foliage, with broad ciliate bracts at the forks: fls. yellow, 1-1 $\frac{1}{4}$  in. across, the staminate with 2 pairs of unlike parts, the pistillate with 5 parts: caps. prominently 3-winged. Bolivia; collected by Mr. Pearce for Messrs. Veitch of London; source of the yellow fls. in the common tuberous begonias and also contributing the prevailing lf.-form, sometimes distinguishable in apparently its original character.

41. *B. tuberhybrida*, Voss. TUBEROUS BEGONIAS of gardens. A hort. race of the last fifty years, resulting probably from the crossing of several species, some of them with only radical scapes: the cult. kinds have erect or diffuse more or less branching hairy succulent sts. about 1 ft. high, and fls. on axillary peduncles: lvs. mostly obliquely cordate-ovate, acuminate, with insertion of petiole in deep sinus about one-third distance from the basal end, margins angled, dentate and ciliate, hairy on veins beneath: fls. various, double or single, 2 in. or more across, yellow to red, purplish, and white.

## 117. CACTACEÆ. CACTUS FAMILY

A singular family of American plants interesting because of the fleshy, condensed, usually spiny and leafless st. and the large often brilliant and showy

## CACTACEÆ

fls., comprising, according to the most recent treatment, about 100 genera and not less than 1,000 species, practically confined to the dry regions of trop. and subtrop. Amer., Mex. being the center of distribution, one species apparently native in Afr. A few species are cult. for economic purposes, but mostly as odd plants for desert gardens and as greenhouse curiosities; any number of kinds may be found among fanciers' collections; the following brief account includes those most commonly cult., and an attempt is made to give the student a conception of the group.—Perennial plants of various habit, usually armed with spines and glochids (barbed spines or bristles), the sts. succulent and mostly spiny, cylindric, globular, flattened or fluted, and often constricted or jointed, mostly more or less branched: lvs. usually none, if present flat and commonly fleshy or much reduced and mostly caducous, with axillary areoles (oval or circular areas bearing branches, fls., spines, glochids, hairs or glands): fls. usually bisexual, regular or irregular, perigynous or epigynous, solitary or clustered, often large and showy; perianth with or without tube, sharply or not at all differentiated into sepals and petals, the petals few or numerous; stamens usually numerous, sometimes clustered; style 1; stigma 2- to many-lobed; ovary 1-celled, distinct or forming part of a branch, many-ovuled: fr. a berry, juicy and often edible, or sometimes dry.—The genus *Carnegiea* (named for Andrew Carnegie), of Ariz., Calif., and Mex., is represented by the single species, *C. gigantea*, Britt. & Rose (*Cereus giganteus*, Engelm), commonly known as Sawarro. The plant has large columnar sts., simple or branched, 20–60 ft. high, strongly ribbed and with numerous spines. The white fls. are diurnal, borne from the upper areoles. This great cactus does not do well in cult., although large plants are often brought into greenhouses and to grounds about railroad stations in the S. W. The edible berry-like fr. is gathered in great quantities by the Indians. Of the genus *Cactus* itself, as founded by Linnæus and defined by Britton & Rose, 18 species are described, none of which appears to be in common cult.; it includes the plants heretofore named under *Melocactus*.

- A. Lvs. broad, flat: glochids wanting: fls. stalked, often clustered. . . . . 1. PERESKIA
- AA. Lvs. terete or subterete or wanting: fls. sessile.
  - B. Areoles with glochids: vegetative parts bearing lvs. which are usually small and fugacious: fls. rotate (petals erect in *Nopalea*).
    - c. Stamens much longer than petals: plants with definite trunk. . . . . 2. NOPALEA
    - cc. Stamens shorter than the petals: plants usually much branched from base. . . . . 3. OPUNTIA
  - BB. Areoles without glochids: vegetative parts usually without lvs.: fls. with definite tubes (except *Rhipsalis*).
    - c. Perianth not rotate; segms. several or many.
      - d. The areoles mostly spine-bearing: joints ribbed, angled, or tubercled, very rarely flat.
        - e. Fls. and spines borne at the same areoles.
          - f. Joints several to many, long.
            - g. Plants erect, bushy, diffuse or climbing.
              - h. Ovary naked, or rarely bearing a few scales which sometimes subtend tufts of short hairs: plants mostly columnar or with columnar branches.
                - i. Perianth funnelform, elongate. . . . . 4. CEREUS
                - ii. Perianth short-campanulate or short-funnelform to pyriform. . . . . 5. CEPHALOCEREUS
              - HH. Ovary scaly, often woolly, setose or spiny: plants slender or weak. . . . . 6. NYCTOCEREUS
            - GG. Plants vine-like, with aerial roots.
              - h. Scales of ovary and fr. large and foliaceous, their axils rather spiny, hairy or bristly. . . . . 7. HYLOCEREUS
              - HH. Scales of ovary and fr. not large nor foliaceous, their axils spiny, hairy or bristly.
                - i. Fls. elongate-funnelform. . . . . 8. SELENICEREUS
                - ii. Fls. short-funnelform or funnelform-campanulate. . . . . 9. APOROCACTUS
      - FF. Joints 1 or few, usually short.
        - g. Position of fls. at lateral areoles. . . . . 10. ECHINOCEREUS
        - gg. Position of fls. at central areoles.

- H. Axils of scales on ovary and fr. naked.....11. FEROCACTUS  
 HH. Axils of scales on ovary hairy, woolly or setose.....12. ECHINOCACTUS  
 EE. Fls. and spines borne at different areoles: short 1-jointed  
     cacti.....13. MAMMILLARIA  
 DD. The areoles mostly spineless: joints many, long, flat.  
     E. Sts. weak, divided into many short joints.....14. ZYGOCACTUS  
     EE. Sts. stouter, with elongated joints.....15. EPIPHYLLUM  
 CC. Perianth rotate; segms. few: mostly spineless, epiphytic, slender,  
     many-jointed cacti.....16. RHIPSALIS

1. **PERESKIA**, Mill. Also written *Peirescia*, *Peireskia*, and *Perescia*. Trees, shrubs, or vines, some grown for ornament and also for the edible fr.; probably about 20 species native in Mex., W. Indies, Cent. and S. Amer.—Resembling other woody plants in having leafy branching sts.: spines in axillary pairs or clusters, neither sheathed nor barbed: glochids wanting: lvs. alternate, deciduous, broad and flat or somewhat fleshy: fls. rotate, solitary, stalked, corymbose or paniced, terminal or axillary; stamens numerous; style single; ovary naked or leafy: fr. juicy, sometimes edible; seeds black, thin-shelled. (*Peresk-ia*: named for Nicolas Claude Fabry de Peirese, 1580–1637.)

- Plants of climbing habit: spines on young branches 2, short and re-  
 curved.....1. *P. aculeata*  
 Plants shrubby or tree-like: spines on young branches often solitary,  
 straight.....2. *P. grandifolia*

1. ***P. aculeata***, Mill. (*Cactus Pereskia*, L. *Pereskia Pereskia*, Karst.). LEMON-VINE. BLADE-APPLE. BARBADOS-GOOSEBERRY. Shrub erect at first, later forming a vine, the woody clambering sts. 10–30 ft. long: spines on lower part of st. slender and straight, solitary or in 2's or 3's, those of the young branches short and curved, usually in pairs: lvs. 2–3 in. long, lanceolate to oblong or ovate, short-acuminate, short-petioled: fls. showy and fragrant, white, pale yellow or pinkish, 1–1½ in. across, in panicles or corymbs; ovary leafy and often spiny: fr. light yellow, ¾ in. diam., in age smooth. Widely spread in trop. Amer.—There is a var. with young lvs. richly colored crimson, yellow, and green.

2. ***P. grandifolia***, Harv. (*P. Bleo*, Auth., not *Cactus Bleo*, HBK.). Tree or shrub to 15 ft., mostly having a definite woody trunk up to 4 in. diam. which is very spiny and fleshy, elongated branches usually bearing 1–2 acicular spines at the areoles: lvs. oblong, 3–6 in. long, obtuse or acute, somewhat narrowed at base: fls. purple or rose-colored, 1½–2 in. broad, in small clusters; ovary lf.-bearing: fr. 2 in. long, pear-shaped, many-seeded. Brazil.—One of the most commonly cult. species appearing in many living collections and also in herbaria under the name *P. Bleo*.

2. **NOPALEA**, Salm-Dyck. Branching cacti, a few widely cult. in warmer parts of the world, either as ornamentals or for commercial purposes; species about a half-dozen, native to Mex., Guatemala, and perhaps also to Cuba; this genus is closely related to *Opuntia* from which it is distinguished by the erect petals and the elongated filaments and style.—Mostly arborescent with definite cylindric trunks and numerous fleshy flattened branches: areoles bearing white wool, glochids and often spines which are solitary or in clusters at the areoles, sheathless: lvs. small, soon deciduous: fls. borne in the areoles usually at or near the edges of the joints; sepals and petals erect, the latter red or pinkish, far exceeded by the numerous stamens and the style; ovary more or less tuberculate, naked or spiny, deeply umbilicate: fr. a juicy red berry, edible and commonly spineless, the numerous flat seeds covered by a hard bony aril. (*Nopa-lea*: from the Mexican name of the cochineal cactus.)

***N. cochinellifera***, Salm-Dyck. COCHINEAL CACTUS. To 12 ft. high, trunks 8 in. thick: branches of ascending or spreading oblong joints, spineless or the older ones with minute spines: glochids numerous, caducous: lvs. small, subulate, early caducous: fls. about 2½ in. long, usually abundant, borne on the upper parts of the joints; sepals and petals scarlet, the petals longer; stamens pinkish, exerted about ½ in.; stigma with 6–7 greenish lobes, longer than the stamens; style with broad disk-like base; ovary subglobose, ¾ in. long, tuberculate, its areoles with many



glochids: fr. red, about 2 in. long, rarely maturing in cult. Original habitat unknown.—Widely grown in semi-trop. countries, but seldom found in the U. S. Interesting chiefly as being one of the important food-plants of the cochineal insect (whence the name, *cochinellifera*), yielding a scarlet dye.

3. **OPUNTIA**, Mill. PRICKLY-PEAR. Probably at least 250 species, growing naturally from Mass. to B. C. south to Magellan Strait; several have been naturalized and have become abundant locally in the Old World; one species widely grown in warm regions for its edible fr., others used as hedges or as forage for stock; many species may be found in the collections of fanciers.—Very variable in size and habit, ranging from small prostrate plants a few in. high to widely spreading forms much-branched from base, or sometimes trees with definite trunks and spreading tops 20 or more ft. high; roots fibrous or sometimes thick and fleshy; sts. and branches of flat, cylindric or globose joints, usually very fleshy, sometimes woody: spines solitary or clustered, sometimes wanting, naked or sheathed: glochids commonly numerous, borne above the spines: lvs. mostly small, terete and soon deciduous: fls. borne singly toward the upper part of the joints; sepals green or colored, usually grading into the petals; corolla showy, green, red, or yellow, the petals spreading; stamens much shorter than the petals, sensitive; style single, thick, stigma shortly lobed: fr. a berry, often edible, spiny or naked, globose, ovoid or ellipsoid; seed white and flattened. (*Opuntia*: old Latin name used by Pliny, later used for the Indian fig, probably derived from *Opus*, a town in Greece.)

Spines present: fls.  $2\frac{1}{2}$ –3 in. across.....1. *O. Engelmannii*  
 Spines usually lacking: fls. 3–4 in. across.....2. *O. Ficus-indica*

1. **O. Engelmannii**, Salm-Dyck. Widely spreading and bushy, usually without definite trunk, sometimes erect and 6–7 ft. high: joints oblong to orbicular, 8–12 in. long, thick, pale green: spines usually whitish with brownish bases or tips: glochids numerous, brown with yellowish tips: lvs. subulate, about  $\frac{1}{2}$  in. long, caducous: areoles distant: fls. yellow, fading to red,  $2\frac{1}{2}$ –3 in. diam.: fr. red, about  $1\frac{1}{2}$  in. long. (For Geo. Engelmann, page 87.) Tex., Ariz., and New Mex., south into Mex.

2. **O. Ficus-indica**, Mill. INDIAN-FIG. Bushy or sometimes tree-like with a woody trunk, 10–15 ft.: joints elliptic or oblong, thick, often 15 in. long, with a bluish bloom, usually spineless: glochids yellow, numerous, soon falling: lvs. subulate, very short, caducous: fls. yellow, 3–4 in. across; ovary 2 in. long: fr. red, edible, 2–3½ in. long, umbilicate. Nativity not known, but now widely cult. in the tropics and subtropics for its fr., and sometimes escaped.

4. **CEREUS**, Mill. Usually arborescent cacti with spiny ribs, a few species grown in this country, mostly under glass; about two dozen species, extending from the southern W. Indies through E. S. Amer. to Argentina.—With mostly tall and erect sts. but sometimes low and spreading or prostrate, usually much-branched; branches strongly angled or ribbed: areoles spiny, more or less short-woolly: fls. large, elongate, nocturnal, usually borne singly along the sides of the st.; perianth deciduous soon after anthesis, the outer segms. thick and greenish or dull-colored, the inner thin and white or in one species red; stamens numerous, not exserted; style often included, stigma lobed; ovary bearing a few scales: fr. fleshy, red, rarely yellow, naked, often edible, splitting down one side when mature; seeds black. (*Cereus*: from the Latin, but of uncertain application.)

**C. peruvianus**, Haw. HEDGE CACTUS. Tree-like with large much-branched top, 30–50 ft. high; branches usually green, sometimes glaucous, 4–8 in. diam., 6–9- (sometimes 4-) ribbed: spines 5–10, acicular, brown to black,  $\frac{1}{2}$ –1¼ in. long: fls. white, about 6 in. long, with a thick tube: fr. almost globose, orange-yellow, somewhat glaucous, about 1½ in. diam.; seeds black, rough. S. E. S. Amer.; widely planted in trop. Amer.

5. **CEPHALOCEREUS**, Pfeiff. Columnar cacti occasionally found in large collections; 48 known species, from S. Fla. and N. Mex. to E. Brazil and Ecuador.—Mostly elongated and erect, but occasionally much-branched with a short trunk or rarely with spreading procumbent branches: areoles developing wool or long white hairs often forming a dense head-like mass at or near the top: fls. nocturnal, small, the perianth usually persisting on the fr.: fr. depressed-globose or oblong; seeds black. (Cephalocereus: Greek *head Cereus*.)

**C. senilis**, Pfeiff. (*Pilocereus senilis*, Lem.). OLD-MAN CACTUS. Columnar, simple or rarely branched, reaching a height of 35 ft. and a diam. of 1 ft., with numerous ribs and a head-like mass of gray bristles encircling the top or rarely confined to one side: fl. 2 in. long, rose-colored; tube with few scales: fr. obovoid, 1-1½ in. long, topped by the base of the fl., having a few minute scales with axillary hairs. Mex.

6. **NYCTOCEREUS**, Britt. & Rose. Erect or clambering cacti sometimes grown for their showy night-blooming fls.; about 5 species, native to Mex. and Cent. Amer.—Slender, sparingly branched, the sts. and branches cylindric, with numerous low ribs: each areole with a tuft of short white wool and small bristles or weak spines: fls. large, white, nocturnal; perianth funnelform, the tube and ovary covered with small scales bearing axillary tufts of spines, the scales grading into the blunt outer perianth-segms.; inner perianth-segms. widely spreading; stamens numerous, shorter than the perianth; style about as long as the stamens: fr. fleshy, scaly, spiny or bristly, with large black seeds. (Nyctocereus: *night* and *Cereus*.)

**N. serpentinus**, Britt. & Rose (*Cereus serpentinus*, DC.). Sts. clustered, at first erect, then clambering or hanging, often 9 ft. long and 1-2 in. diam., with 10-13 low rounded ribs: areoles close together, felted and with acicular or bristle-like spines, sometimes 1 in. long: fls. white, 6-7 in. long, 3 in. broad, terminal or at the upper areoles, the perianth-tube and ovary bristly: fr. red, 1½ in. long, bearing deciduous spines. Mex.—Not recently reported in wild state, but is widely cult. in Mex. and now escaped.

7. **HYLOCEREUS**, Britt. & Rose. NIGHT-BLOOMING CEREUS. Eighteen species of climbing cacti, the sts. adhering to walls or other support by means of numerous aerial roots, native of the W. Indies, Mex., Cent. and N. S. Amer., only one grown to any extent in this country, and that under a wrong name.—Sts. elongated, 3-angled or 3-winged, with aerial roots: areoles felted and short-spinose or spineless, on young growths bristly: fls. white, rarely red, very large, nocturnal, funnelform, the limb very broad; ovary and tube with large scales, without spines, wool or hairs; stamens numerous, in 2 series, equaling or shorter than the style; stigma with many simple or branched lobes: fr. a fleshy berry, spineless but scaly, mostly large and edible; seeds small, black. (Hylocereus: *wood* and *Cereus*, i.e., forest cereus.)

**H. undatus**, Britt. & Rose (*H. tricostratus*, Britt. & Rose. *Cereus triangularis*, Haw.). St. long, rising over bushes, trees, and walls, the 3 broad thin ribs with margin undulate and in age more or less horny: areoles 1½ in. apart, with 1-3 small spines: fls. about 1 ft. long, the yellowish-green outer perianth-segms. turned back, the pure white inner ones erect; stamens and numerous stigma-lobes cream-colored: fr. oblong, 4½ in. diam., red, scaly or when mature nearly smooth, edible. Tropics and subtropics.—The best known of all night-blooming cereuses, widely cult. and in trop. countries making a beautiful hedge plant.

8. **SELINICEREUS**, Britt. & Rose. More or less epiphytic cacti with trailing or climbing sts.; 16 species, ranging from S. Tex. through E. Mex., Cent. Amer., the W. Indies, and along the northern coast of S. Amer., one in Argentina, several of them great favorites in cult. because of the great size and beauty of their fls.—Sts. with ribbed or angled joints, with aerial roots: areoles small, sometimes elevated on small knobs, usually with small spines:

fls. white, often very large, nocturnal, the scales of the ovary and long curved perianth-tube with axillary felt, hairs and bristles; outer perianth-segms. narrow, greenish, brownish or orange; stamens in 2 separate clusters; style elongate, often hollow, stigma with numerous lobes: fr. large, reddish, bearing deciduous spines, bristles and hairs in clusters. (*Selenicereus*: moon goddess and *Cereus*.)

**S. pteranthus**, Britt. & Rose. Sts.  $1\frac{1}{2}$  in. diam., bluish-green to purple, with 4-6 strong angles: spines 1-4, short, dark: fls. white, very fragrant, often 1 ft. long; lower cluster of stamens attached to the perianth-tube for about 3 in.; stigmalobes numerous; ovary covered with white silky hairs and bristles nearly  $\frac{1}{2}$  in. long: fr. red, globose,  $2\frac{1}{2}$  in. diam. Mex.—One of the commonest night-blooming cacti, often found in conservatories.

**9. APOROCACTUS**, Lem. Vine-like forms, one common in cult. as a window-plant; species 5, mostly Mex.—Sts. creeping or clambering, sending out aerial roots: fls. pink or red, rather small, day-blooming, one at an areole, the funnelform tube straight or curved; outer perianth-segms. linear, scattered, the inner broad and more compact; stamens exerted, in a single one-sided cluster, the filaments attached along the throat: fr. globose, small, reddish, bristly, with few reddish-brown seeds. (*Aporocactus*: Greek *impenetrable* and *cactus*.)

**A. flagelliformis**, Lem. (*Cereus flagelliformis*, Mill.). RATTAIL CACTUS. St. and branches slender and weak,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., at first ascending or erect, becoming prostrate and creeping or even pendent; ribs 10-12, low and inconspicuous, slightly tuberculate: areoles with many brownish spines: fls. crimson, 3 in. long, opening for three to four days, the outer perianth-segms. more or less reflexed, the inner only slightly spreading: fr.  $\frac{1}{2}$  in. diam., with yellowish pulp. Mex., Cent. and S. Amer.

**10. ECHINOCEREUS**, Engelm. Low cacti, erect, prostrate or pendent, some cult. for their large attractive fls.; species about 60, confined to the arid regions of W. U. S. and Mex.—Sts. single or clustered, globose to cylindric, strongly ribbed, 1- to few-jointed: areoles borne on the ribs and usually spinose: fls. solitary, lateral, usually large, diurnal but in some species not closing at night; perianth campanulate to short funnel-shaped, red, purple, or rarely yellow, the tube and ovary spiny; lobes of stigma green: fr. colored, thin-skinned, often edible, with spines which are easily detached when mature and black tuberculate seeds. (*Echinoce-reus*: spiny *Cereus*.)

Fls. scarlet to salmon-colored.....1. *E. polyacanthus*  
Fls. purple.....2. *E. pectinatus*

**1. E. polyacanthus**, Engelm. Sts. caespitose, forming clumps of 20-50, pale green or reddish-tinged, with about 10 low ribs: spines numerous, pale yellow becoming gray or purplish, those on the ovary and perianth-tube yellow and mixed with wool: fls. crimson,  $2\frac{1}{2}$  in. long. New Mex. and Ariz. to Mex.

**2. E. pectinatus**, Engelm. Simple, erect, the cylindric sts. 4-6 in. long,  $2\frac{1}{2}$  in. diam., almost hidden and more or less banded by the many short interlocking white or rose-colored spines; ribs 20-22, usually straight: areoles close together, those on the fl.-tube and ovary felted and very spiny: fls. purplish,  $2\frac{1}{2}$ –3 in. long: fr. with deciduous spines,  $\frac{3}{4}$ – $1\frac{1}{4}$  in. diam. Cent. Mex.

**11. FEROCACTUS**, Britt. & Rose. About 30 species of globose or cylindric cacti of S. W. U. S. and Mex.—Sts. prominently ribbed, armed with well-developed straight or hooked spines: areoles mostly large, more or less felted when young: fls. commonly large, broadly funnelform to campanulate and with short tube, borne only on the young areoles just above the spine-clusters; stamens very many, short, borne on the throat of the perianth; ovary and fl.-tube very scaly, the scales naked in the axils: fr. oblong, usually thick-walled and dry, opening by a large basal pore, with black, pitted, never tuberculate

seeds. (*Ferocactus*: *ferus* and *cactus*, fierce cactus, referring to the very spiny character of the plants.)

The central spine hooked: giant plant.....1. *F. Wislizeni*  
The spines all straight: plants much smaller.....2. *F. glaucescens*

1. *F. Wislizeni*, Britt. & Rose (*Echinocactus Wislizeni*, Engelm. *E. Emoryi*, Engelm.). At first globose, finally cylindric and 6 ft. long or more, usually simple; ribs numerous: areoles elliptic, sometimes 1 in. long, brown-felted, with many spines, one of the stout central spines strongly hooked: fls. yellow or red, 2-2½ in. long: fr. yellow, oblong, 1½ in. long, with scales; seeds dull black, shallowly pitted. (Named for Dr. A. Wislizenius, who collected in early days in W. U. S.) Tex. to Ariz. south into Mex.

2. *F. glaucescens*, Britt. & Rose (*Echinocactus Pfeifferi*, Zucc.). Globose or a little higher than broad, 8-16 in. diam., glaucous, with 11-15 somewhat flattened ribs: areoles oblong, large: spines all straight: fls. yellow, ¾ in. long, the inner perianth-segms. somewhat toothed or lacerate; ovary with brownish scales. Mex.

12. **ECHINOCACTUS**, Link & Otto. Large thick cylindric cacti, sometimes cult. as curiosities; a genus of 9 species as now understood, native to S. W. U. S. and Mex.—Sts. several- to many-ribbed, the top clothed with a dense mass of wool or nearly naked: areoles very spiny, large, on old plants sometimes united: fls. usually yellow, rarely pink, medium-sized, borne on the crown of the plant and often partly obscured by the dense wool; outer perianth-segms. sometimes with pungent tips; scales of the fl.-tube numerous, persistent, those of the ovary narrow and with matted wool in the axils: fr. oblong, densely white-woolly, with blackish, usually smooth and shining seeds. (*Echinocactus*: Greek *spine* and *cactus*.)

*E. Grusonii*, Hildmann. GOLDEN CACTUS. Large plants with single depressed-globose st. often 16-30 in. diam.; ribs many: spines numerous, golden-yellow when young, becoming pale or brownish: fls. red and yellow, 1½-2½ in. long, opening in bright sunlight; stamens yellow, connivent into a cylinder; scales of ovary with an abundance of wool in their axils: fr. oblong to globose, ½-¾ in. long, white-woolly or naked below; seeds smooth and shining. (Named in honor of Herr Gruson of Buckow near Magdeburg.) Mex.

13. **MAMMILLARIA**, Haw. Globose or condensed small spiny plants grown in greenhouses or some of the species out-of-doors in the far S.; in the genus as traditionally conceived, some hundreds of species have been described; as recently restricted (under another name), 150 are retained.—Short 1-jointed cacti with sts. simple or clustered, commonly hemispheric or short-cylindric, the surface entirely broken up into tubercles: fls. usually short-funnelform, with naked or nearly naked tube and ovary, borne in the more or less woolly axils between the tubercles or at the upper extremity of a narrow groove on their upper surface: fr. globose to linear-clavate, nearly always smooth and berry-like. (*Mammilla-ria*: Latin *mammila*, referring to the nipple-like tubercles.)

*M. longimamma*, DC. Bright green, cespitose, forming large low clumps: tubercles sometimes more than 2 in. long (whence the name, *longimamma*), of loose soft texture: spines straight, pubescent: fls. yellow, regular, tubular, 2 in. or more across. Mex.

14. **ZYGOCACTUS**, K. Schum. Flat-stemmed short-jointed cacti often cult. for the bright showy fls. profusely borne in winter; a Brazilian genus, many of whose cult. forms have been produced through hybridization between the different species and with *Epiphyllum* and the allies of *Cereus*; typical plants are rarely seen.—St. much-branched, the many short joints flat or in age becoming rounded, bearing areoles only in the margins and more or less truncate ends, from which grow the new branches and the conspicuously zygomorphic fls.; ovary bractless, the bracts of the tube rather



large and colored as the petals. (Zygocactus: cactus with zygomorphic fls.)—Genus closely allied to Epiphyllum, the plants in their native surroundings growing as epiphytes on the trees.

**Z. truncatus**, Schum. (*Epiphyllum truncatum*, Haw.). CRAB CACTUS. CHRISTMAS CACTUS. Sts. much branched and hanging in large bunches from the trees; joints obovate to oblong,  $1\frac{1}{4}$ –2 in. long,  $\frac{3}{4}$ –1 in. broad, bright green, strongly truncate at apex, the margins coarsely serrate with 1–3 large acute teeth on each side, the 2 upper ones forming more or less incurved horns on either side of the truncation: areoles bearing a few short yellowish or dark-colored bristles, or sometimes none: fls. horizontal, growing from the truncated end of the younger joints, strongly irregular,  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. long, in various shades of red: fr. pear-shaped, red, about  $\frac{3}{8}$  in. diam. Brazil.

**15. EPIPHYLLUM**, Haw. Flat-stemmed unarmed branching cacti, with very large and showy fls., some popular as house-plants; natives of Mex., Cent. Amer., and trop. S. Amer.—Upright plants with flat 2-edged branches which are crenate or serrate on the margins, spinless: fls. usually large, mostly nocturnal; petals white, red, or yellow; stamens elongated, numerous: fr. oblong, red, juicy, bearing a few bracts; seeds numerous, black. (Epiphyllum: on a leaf, referring to the lf.-like branches on which the fls. grow.)

Tube of fl. always elongated, usually much longer than the limb.

Corolla 2 in. diam. .... 1. *E. Phyllanthus*

Corolla 4 in. diam. .... 2. *E. crenatum*

Tube of fl. short, always shorter than the limb.

Fls. 4–6 in. broad, scarlet-red. .... 3. *E. Ackermannii*

Fls. smaller.

Perianth-tube with spreading scales. .... 4. *E. phyllanthoides*

Perianth-tube without scales. .... 5. *E. biformis*

1. **E. Phyllanthus**, Haw. (*Phyllocactus Phyllanthus*, Link). Joints shallowly crenate: corolla angled, twisted, the comparatively small limb 2 in. diam., shorter than the tube: fr. globose. (Phyllanthus: Greek leaf and flower, young lvs. are borne in place of the old withered fls.) Brazil, Guiana, and the Antilles.

2. **E. crenatum**, Don (*Phyllocactus crenatus*, Lem.). Sts. about 3 ft. long, erect, thick, strongly crenate, somewhat glaucous; midrib very thick: fls. very fragrant, 6–10 in. long, 4 in. diam., day-blooming; perianth-tube 4–5 in. long; petals white or cream-colored, drying yellow; style white. Guatemala and S. Mex. and perhaps also from Honduras.

3. **E. Ackermannii**, Haw. (*Phyllocactus Ackermannii*, Salm-Dyck). Sts. numerous, sometimes 3 ft. long, somewhat recurved; branches mostly less than 1 ft. long, with evident middle and side ribs: areoles on the lower and younger shoots bearing short bristles: fls. day-blooming, scarlet-red outside, carmine-red within, the throat greenish-yellow; tube very short; limb wide-spreading, 4–6 in. diam. (Bears the name of Geo. Ackermann, collector of this species in Mex.) Not known in the wild state.

4. **E. phyllanthoides**, Sweet (*Phyllocactus phyllanthoides*, Link). Branches at length hanging, cylindric at base, lanceolate above; serratures obtuse; middle and side ribs evident: bristles few: fls. day-blooming, smaller than in No. 3, the tube 2 in. or less long, with spreading scales, the limb somewhat longer, often striate; style white. S. Mex.

5. **E. biformis**, Lab. Soon pendulous, the branches cylindric; short branches lf.-like, the lower ovate, the upper more elongate: fls. purple-red, day-blooming, 2– $2\frac{1}{2}$  in. long, less than 2 in. expansion; fl.-tube without scales, those of the ovary few and minute: berry red-purple, with very small seeds. Honduras.

**16. RHIPSALIS**, Gaertn. About 50 species of epiphytic cacti mostly confined to S. Amer., 1 or 2 indigenous to Afr., occasionally grown in green-houses.—Many-branched succulents, with small, glabrous or felted areoles from which small bristles or sometimes thorns are produced: fls. very small, usually without tube; stamens and style very short: fr. a small naked berry. (Rhypsalis: Greek *rhyps*, wicker-work.)

**R. Cassytha**, Gaertn. Sts. profusely branched, pendulous, sometimes 10 ft. long, the pale green branches  $\frac{1}{2}$  in. diam., rarely 2 ft. long; ultimate branchlets

spirally attached: areoles with sparse woolly hairs and frequently 1-2 minute bristles: fls. lateral on the terminal joints,  $\frac{1}{6}$ - $\frac{1}{4}$  in. diam.: berry like that of mistle-toe,  $\frac{1}{2}$ - $\frac{1}{6}$  in. diam. (Cassytha: synonym of Cuscuta, which the plant resembles.) Widely dispersed in Cent. and S. Amer., W. Indies, Mex., Mauritius, Ceylon, and Afr.

### 118. THYMELÆACEÆ. MEZEREUM FAMILY

Trees or shrubs, rarely herbs, with tough acrid bark, of about 39 genera and 425 species widely distributed, a few grown for ornament.—Lvs. alternate or opposite, simple and entire, exstipulate: fls. regular, usually bisexual, in terminal or axillary heads, racemes or spikes or rarely solitary, the bracts various; receptacle or calyx-tube petaloid, the sepals 4-5 or rarely 6, petals lacking or represented by scales; stamens as many or twice as many as sepals or reduced to 2, usually inserted at mouth of tube; ovary 1-, rarely 2-celled, with 1 ovule in each cell; style short or long: fr. an indehiscent nut, berry or drupe, rarely a dehiscent caps.

|                |            |
|----------------|------------|
| Stamens 2..... | 1. PIMELEA |
| Stamens 8..... | 2. DAPHNE  |

1. **PIMELEA**, Banks & Soland. About 80 species of shrubs or rarely herbs native in Australia, Tasmania, and New Zeal., one or more sometimes grown in greenhouses or in the open in warm countries.—Lvs. alternate or opposite, usually small, the upper ones under the fl. mostly large and sometimes forming a crowded involucre: fls. bisexual or rarely diœcious, usually in terminal many-fl. heads; receptacle or calyx-tube cylindrical with a spreading, rarely erect, 4-lobed limb, the throat without scales but sometimes folded or thickened; stamens 2, inserted on throat opposite the 2 outer sepals, the filaments long or short; ovary 1-celled; style elongated with a capitate stigma: fr. a small nut or drupe, inclosed in the base of the receptacle. (Pimelea: from Greek for *fat*, referring to the fleshy seeds.)

**P. ferruginea**, Labill. (*P. decussata*, R. Br.). Much-branched shrub 1-3 ft. high: lvs. opposite, sessile, usually crowded, ovate or oblong,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, obtuse or mucronate, of firm texture, the margins revolute: heads globular, subtended by 4 glabrous orbicular involucrel lvs. which are pink or red or tinged only at margin; fls. rose-colored, very hispid at base. W. Australia.

2. **DAPHNE**, L. Erect or prostrate shrubs native in temp. and subtrop. Eu. and Asia, a few planted in borders or sometimes grown in the greenhouse.—Lvs. alternate or rarely opposite, evergreen or deciduous, short-petioled: fls. fragrant, in clusters or short racemes, sometimes subtended by involucrel bracts; receptacle or calyx-tube corolla-like, cylindrical, with a 4-lobed spreading limb; stamens 8, inserted in 2 rows on the tube, the upper sometimes slightly exserted, filaments very short; ovary 1-celled, the style very short or almost none with a large capitate stigma: fr. a fleshy or leathery drupe. (Daph-ne: Greek name of *Laurus nobilis*.)

Fls. in axillary clusters along branches of previous year, appearing before lvs.

|                     |                       |
|---------------------|-----------------------|
| Lvs. alternate..... | 1. <i>D. Mezereum</i> |
| Lvs. opposite.....  | 2. <i>D. Genkwa</i>   |

Fls. in terminal heads, with the lvs.

|   |                      |
|---|----------------------|
| Branches trailing, pubescent: lvs. $\frac{1}{2}$ -1 in. long..... | 3. <i>D. Cneorum</i> |
| Branches erect, glabrous: lvs. 2-3 in. long.....                  | 4. <i>D. odora</i>   |

1. **D. Mezereum**, L. Erect deciduous shrub to 4 ft. high: lvs. alternate, cuneate, oblong or oblanceolate, 2-3 in. long, thin and glabrous: fls. in sessile clusters of 2-5 along the branches of the previous year, appearing before the lvs. from Feb. to Apr., lilac-purple, fragrant, silky outside,  $\frac{1}{2}$  in. or less long: fr. roundish-ovoid, scarlet, about  $\frac{1}{4}$  in. long. (Mezereum: native Persian name.) Eu., W. Asia.—There are vars. with white fls. and yellow fr., larger purple fls., and double fls.

2. **D. Genkwa**, Sieb. & Zucc. Deciduous shrub to 3 ft. high: lvs. opposite, oblong-elliptic, 1-2 in. long, pubescent on veins beneath: fls. in short-stalked

clusters of 3-7 along branches of the previous year, appearing in Mar. or Apr. before the lvs., lilac, not fragrant, about  $\frac{1}{2}$  in. long, densely silky-villous outside. (Genkwa: Japanese name.) China.

3. *D. Cneorum*, L. Low evergreen shrub with trailing pubescent branches: lvs. alternate and crowded, cuneate, oblanceolate,  $\frac{1}{2}$ -1 in. long, mucronulate, dark green and glossy above, glaucescent beneath: fls. in sessile many-fl. terminal heads without bracts, pink, fragrant, about  $\frac{1}{2}$  in. long. (Cneorum: pre-Linnæan substantive name.) Mts. of Eu.

4. *D. odora*, Thunb. (*D. sinensis*, Lam.). Erect evergreen shrub to 4 ft., the branches glabrous: lvs. alternate or crowded, oblong-elliptic, 2-3 in. long, bluntly pointed, glabrous: fls. in dense terminal heads subtended by 6-10 persistent lanceolate bracts, white to purple, very fragrant, blooming in early spring. China, Japan.—There are several color races having white, purple, red, or white fls. spotted with red. In one var. the lvs. are bordered with yellow.

## 119. ELÆAGNACEÆ. OLEASTER FAMILY

Three genera of more than 45 species distributed mostly in temp. and sub-trop. regions of the northern hemisphere, grown for ornament and a few for their edible frs.—Trees or shrubs covered with silvery or golden-brown peltate or stellate scales: lvs. alternate or opposite, entire: fls. bisexual or unisexual, in axillary clusters or racemes or at the nodes of last year's branches, rarely solitary, the bracts small and deciduous; receptacle of calyx-tube of bisexual and pistillate fls. long-tubular, 2-4-lobed, constricted above ovary and persistent, becoming fleshy in fr.; petals 0; stamens as many as sepals and alternate with them or twice as many, inserted in throat of receptacle, the filaments free; ovary sessile, 1-celled, 1-ovuled, with an elongated style: fr. an achene or nut inclosed by the fleshy receptacle.

Lvs. alternate: stamens 4.

Sepals 4: fls. bisexual.....1. ELÆAGNUS

Sepals 2: fls. unisexual.....2. HIPPOPHAE

Lvs. opposite: stamens 8.....3. SHEPHERDIA

1. *ELÆAGNUS*, L. Deciduous or evergreen, sometimes spiny shrubs or small trees, of about 40 species in S. Eu., Asia and N. Amer.—Thickly covered with silvery or brownish peltate scales: lvs. alternate, short-petioled: fls. bisexual, usually solitary or clustered in the axils, often fragrant; perianth campanulate or tubular, the 4 lobes deciduous, white or yellow inside; stamens 4, the filaments very short: fr. drupe-like, the nut inclosed by the fleshy receptacle or perianth-tube. (Elæag-nus: ancient Greek name, applied to some other plant.)

Lvs. evergreen, leathery.....1. *E. pungens*

Lvs. deciduous.

Fr. on stalk  $\frac{3}{4}$ -1 in. long: lvs. silvery beneath with few brown scales.....2. *E. multiflora*

Fr. on stalk about  $\frac{1}{4}$  in. or less long or sometimes nearly sessile: lvs.

silvery beneath, without brown scales.

Perianth-tube about as long as limb: fr. yellow.....3. *E. angustifolia*

Perianth-tube much longer than limb: fr. scarlet.....4. *E. umbellata*

1. *E. pungens*, Thunb. Spreading evergreen shrub to 6 ft. or more high, mostly spiny; branchlets covered with brown scales: lvs. leathery, oval or oblong, 2-4 in. long, margins undulate, dark green and finally glabrous above, silvery beneath dotted with brown scales: fls. clustered in lf.-axils, pendulous, fragrant, blooming in autumn, the cylindrical perianth-tube longer than the limb and slightly narrowed at base: fr. about  $\frac{1}{4}$  in. long, short-stalked, covered with silvery and brown scales, red when ripe. Japan, China.—Runs into many forms, some of the most important of which are: Var. *Frederici variegata*, Servettaz. Lvs. with yellow center and green margin. Var. *maculata*, Hort. (var. *aureo-maculata*, Hort.). Lvs. with large yellow blotch in middle. Var. *reflexa*, Rehd. (*E. reflexa*, Morr. & Decne.). Branches elongated and flexible: lvs. very brown-scaly beneath, the margins not undulate. Var. *Simoni*, Rehd. (*E. Simoni*, Hort.). Lvs. with few or no brown scales beneath, in one form variegated with yellowish- and pinkish-white. Var. *variegata*, Rehd. Lvs. margined with yellowish-white.

2. *E. multiflora*, Thunb. (*E. longipes*, Gray. *E. edulis*, Sieb.). Deciduous shrub to 6 ft. or more, the branchlets covered with reddish-brown scales: lvs. elliptic, ovate or obovate-oblong, 1-2½ in. long, with stellate hairs above but becoming glabrous, silvery beneath with scattered brown scales: fls. solitary or 2 together, fragrant, blooming in Apr. and May; perianth-tube about length of limb: fr. oblong, about ¾ in. long, pendulous, on slender pedicels ¾-1 in. long, scarlet. Japan, China.—There are several lf-forms, such as vars. *rotundifolia*, *ovata*, and *crispa*, Servettaz. Sometimes planted for its acid frs., as Gumi.

3. *E. angustifolia*, L. (*E. hortensis*, Bieb.). OLEASTER. Deciduous shrub or small tree to 20 ft., sometimes spiny; branchlets silvery-white: lvs. lanceolate or oblong-lanceolate, 2-3 in. long, light green above, silvery beneath: fls. 1-3 in the axils of lvs., fragrant, in June; perianth-tube campanulate, about as long as limb: fr. oval, about ½ in. long, on very short stalks, yellow, covered with silvery scales. Eu., W. Asia.—Var. *orientalis*, Dipp. (*E. orientalis*, L.), has oval to oblong lvs. and fr. to 1 in. long. Var. *spinosa*, Schneid. (*E. spinosa*, L.), is more spiny than type.

4. *E. umbellata*, Thunb. Spreading deciduous shrub to 12 ft. or more high, often spiny; branchlets yellowish-brown, often partially silvery: lvs. elliptic to ovate-oblong, 2-4 in. long, with silvery scales above when young, shining and silvery beneath, often crisped at margin: fls. 1-3 or more together, fragrant, in May or June; perianth-tube slender, much longer than limb: fr. globose or oval, ¼-½ in. long, erect, on stalks about ¼ in. long, scarlet, covered with silvery and brown scales when young. Japan, China, Himalayas.

2. **HIPPOPHAE**, L. SEA-BUCKTHORN. Two species of willow-like deciduous shrubs or small trees native in Eu. and W. and Cent. Asia.—Branches spiny; young growth covered with silvery scales or stellate hairs: lvs. alternate, narrow: fls. unisexual, usually diœcious, in short racemes in axils of branches of previous year, the staminate sessile and deciduous, the pistillate short-stalked and the axis usually developing into a branchlet or thorn; staminate fls. with 2 large valvate sepals and 4 stamens with very short filaments; pistillate fls. with a long oblong receptacle or perianth-tube inclosing the ovary and bearing at tip 2 minute sepals: fr. drupe-like, the bony nut inclosed by the fleshy receptacle. (Hippoph-aë: ancient Greek name, referring to some other spiny plant.)

*H. rhamnoides*, L. To 30 ft. high, the twigs usually spine-tipped: lvs. linear-lanceolate, 1-3 in. long, short-petioled, covered on both sides with silvery scales but becoming glabrescent above: fls. very small, yellowish: fr. nearly globose or ovoid, about ¼ in. long, bright orange-yellow, ripening in Sept. and persisting throughout the winter. Eu., W. and Cent. Asia.—Var. *procera*, Rehd., is a taller race to 50 ft. high from W. China. Var. *angustifolia*, Loud., has pendulous branches and narrow lvs.

3. **SHEPHERDIA**, Nutt. (*Lepargyrea*, Raf.). Deciduous shrubs or small trees with scurfy scales; 3 species in N. Amer., one grown for its frs. which are made into jelly.—Lvs. opposite, short-petioled: fls. small, diœcious, in very short spikes or racemes, the staminate many-fl'd., pistillate 2-fl'd.; staminate fls. with 4 valvate sepals and 8 stamens alternating with as many lobes of disk, the filaments very short; pistillate fls. with urn-shaped perianth inclosing ovary and 4-lobed deciduous limb, the 8 lobes of the disk nearly closing the throat, style slightly exserted: fr. drupe-like, the nut inclosed by the fleshy receptacle. (Shepherd-ia: after John Shepherd, 1764-1836, English botanist.)

*S. argentea*, Nutt. BUFFALO-BERRY. Upright thorny shrub to 18 ft., the young growth silvery-tomentose: lvs. oblong or oblong-lanceolate, 1-2 in. long, obtuse, silvery on both sides: fls. yellowish, in Apr. or May: fr. globular or ovoid, about ¼ in. long, red or yellow. Kans. to Minn., west and north.

## 120. LYTHRACEÆ. LOOSESTRIFE FAMILY

More than 20 genera and 400 species of herbs, shrubs, or trees, widely distributed, but most abundant in trop. Amer., several grown for ornament.—Lvs. opposite or whorled (seldom alternate), entire, stipules 0 or small: fls.



bisexual, regular or rarely irregular, mostly axillary, solitary or in cymes or panicles, the pedicels usually 2-bracted; calyx tubular or campanulate, persistent, free from ovary, with 4-6 (3-16) valvate lobes and often with accessory teeth between the lobes; petals as many as calyx-lobes and inserted at mouth of calyx, imbricated, or rarely 0; stamens few or many, inserted on the calyx; ovary superior, sessile or stalked, 2-6-, rarely 1-celled, with many or seldom few ovules in each cell, style simple: fr. a variously dehiscent caps. or indehiscent. *B*, *C*, Fig. 11, page 503.

Calyx-tube straight.

Caps. completely inclosed by calyx: plant an herb.....1. *LYTHRUM*

Caps. not completely inclosed by calyx: plant a shrub or tree.

Sepals and petals 4: fls. small.....2. *LAWSONIA*

Sepals and petals usually 6: fls. large and showy.....3. *LAGERSTRÆMIA*

Calyx-tube gibbous or curved at base.....4. *CUPHEA*

1. **LYTHRUM**, *L.* Annual or perennial herbs widely scattered, of 24 species, a few grown in borders and bog-gardens.—Branches 4-angled: lvs. opposite, rarely whorled or alternate: fls. solitary in the axils or in spikes or racemes, often dimorphous or trimorphous; calyx-tube cylindrical, 8-12-ribbed, with 4-6 primary teeth or lobes and as many appendages in the sinuses; petals 4-6, rarely 0; stamens 4-12, included or exserted; ovary 2-celled, the style filiform: caps. completely inclosed by calyx, septicidally dehiscent by 2 valves or irregularly. (*Lyth-rum*: from Greek for *blood*, referring to color of fls. or perhaps to styptic properties of some species.)

Appendages of calyx twice or more longer than lobes: lvs. rounded or cordate at base.....1. *L. Salicaria*

Appendages of calyx about equaling the lobes: lvs. acute at base.....2. *L. virgatum*

1. ***L. Salicaria***, *L.* SPIKED or PURPLE LOOSESTRIFE. Erect much-branched perennial to 3 ft. and more high, pubescent or sometimes glabrous: lvs. opposite or in whorls of 3, lanceolate, 2-4 in. long, rounded or cordate and clasping at base: fls. purple, to  $\frac{3}{4}$  in. across, in almost sessile whorls aggregated into dense terminal interrupted leafy spikes, trimorphous as to lengths of stamens and style; appendages of calyx twice or more longer than lobes, often half as long as tube. Temp. regions of northern hemisphere and Australia. (*Salicaria*: resemblance to *salix*.)—Runs into many vars. Var. ***roseum superbum***, Hort., has larger rose-colored fls. In var. ***tomentosum***, DC., the whole plant, particularly the infl., is white-tomentose.

2. ***L. virgatum***, *L.* Differs from the above in its very twiggy or virgate glabrous growth, the linear or lanceolate lvs. acute at base: fls. purple, about  $\frac{1}{2}$  in. across, distinctly pedicelled, 1-3 together in the axils of linear bracts, the growing flowering branch forming an open leafy raceme; appendages of calyx equaling or shorter than lobes. Eu., Asia; sparingly naturalized in Mass.

2. **LAWSONIA**, *L.* One variable shrub from N. Afr., Asia, and Australia, but naturalized in trop. Amer., planted for ornament in warm regions and furnishing the famous henna dye.—Glabrous, the branches often spinescent: lvs. opposite, short-petioled: fls. in few- to many-fl'd. corymbs forming a terminal panicle; calyx-tube very short or none, 4-angled, with 4 spreading lobes, without appendages; petals 4, with very short claw, wrinkled; stamens 8, sometimes 4 or 12, inserted at base of calyx-tube, exserted; ovary 2-4-celled, with long style: caps. not completely inclosed by calyx, irregularly dehiscent or indehiscent. (*Lawso-nia*: after John Lawson, Surveyor-General of N. C., burnt by Indians in 1712.)

***L. inermis***, *L.* (*L. alba*, Lam.). **HENNA**. To 20 ft. high: lvs. elliptic or elliptic-lanceolate,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long: fls. very fragrant, white, rose, or cinnabar-red,  $\frac{1}{4}$  in. or less across: caps. nearly  $\frac{1}{4}$  in. diam.

3. **LAGERSTRÆMIA**, *L.* Shrubs or trees, one widely grown in the S. for its showy fls.; about 30 species in S. and E. Asia and adjacent isls. and Australia.—Lvs. opposite or the upper ones alternate: fls. in axillary or

terminal panicles, the peduncles and pedicels with deciduous bracts; calyx top-shaped or hemispherical, often ridged or winged, with usually 5-8 lobes; petals 5-8, clawed, the limb often crinkled or fringed; stamens 15-200; ovary sessile, 3-6-celled, with long style: caps. woody, oblong, not completely inclosed by calyx, loculicidally dehiscent by 3-6 valves; seeds winged. (Lagerstræmia: after Magnus v. Lagerström, 1696-1759, Swedish friend of Linnæus.)

- Lvs. 1-2 in. long: calyx smooth.....1. *L. indica*  
Lvs. 4-12 in. long: calyx grooved.....2. *L. speciosa*

1. *L. indica*, L. CRAPE-MYRTLE. Deciduous glabrous shrub growing 10-20 ft. high, with smooth brown bark: lvs. very short-petioled or sessile, elliptic or oblong, 1-2 in. long, mostly acute, pubescent on veins beneath: fls. pink, white, or purple, 1-1½ in. across; calyx glabrous, not ribbed; petals 6, fringed, the claw very long and slender; stamens 36-42: caps. ¼-½ in. long. Asia, N. Australia; naturalized in American tropics and in S. U. S.

2. *L. speciosa*, Pers. (*L. Flos-Reginæ*, Retz. *L. Reginæ*, Roxb.). Large tree to about 80 ft. high, furnishing valuable timber: lvs. short-petioled, oblong- or ovate-elliptic, 4-12 in. long, leathery, obtuse or acuminate: fls. 2-3 in. across, in large terminal panicles, varying from mauve or pink to purple; calyx with 12 grooves or ridges, the lobes reflexed; petals 6, erose-wavy, with a short claw; stamens 130-200, in series: caps. globose or oblong, about 1 in. long. India to S. China and E. Indies to Australia.

4. CUPHEA, Adans. Over 200 species of herbs or shrubs in N. and S. Amer., several grown in greenhouses and in the open S.—Lvs. opposite or whorled: fls. irregular, solitary or racemose, the pedicels between the petioles or rarely axillary; calyx-tube elongated and corolla-like, ribbed, spurred or gibbous at base, oblique at mouth, with 6 primary teeth or lobes and usually as many accessory teeth; petals 6, unequal or rarely 2 or 0; stamens 11, rarely 9, 6, or 4, the filaments short; ovary commonly superior, sessile, with gland at base, unequally 2-celled with few or many ovules in each cell, the slender style with capitate 2-lobed stigma: caps. oblong, inclosed by calyx, laterally dehiscent. (Cuphea: Greek for *curved*, referring to protuberance at base of calyx-tube.)—These plants are sometimes known as *Parsonsia*.

- Calyx-tube large and prominent, but the petals at its throat minute and inconspicuous.....1. *C. micropetala*  
Calyx-tube of medium size, but some or all the petals large and showy.  
Petals 6 and all alike or nearly so: lvs. very small.....2. *C. hyssopifolia*  
Petals 2, or if 6 then 4 of them minute and usually not apparent.  
Fls. single in or near the axils.  
Calyx gibbous or swollen at base.....3. *C. miniata*  
Calyx distinctly spurred on upper side at base.....4. *C. Hookeriana*  
Fls. in short axillary racemes.....5. *C. Roe-lii*  
Calyx-tube medium, highly colored; petals none.....6. *C. platycentra*

1. *C. micropetala*, HBK. (*C. jorullensis*, Lindl., not HBK. *Parsonsia micropetala*, Hitchc.). Shrub 1-2 ft. high, more or less setose-hairy or almost glabrous, strongly erect, main shoots nearly or quite simple: lvs. lanceolate to oblong-lanceolate, short-petioled, 2-5 in. long, acute: fls. extra-axillary in a long terminal leafy raceme, about 1 in. long, yellowish with scarlet at base, the tube hairy, constricted toward top and oblique at orifice; petals 6, shorter than the 12 small calyx-teeth; stamens red, exserted. Mex.

2. *C. hyssopifolia*, HBK. Little shrub, much branched, hairy: lvs. many and crowded, very small, usually ¼-½ in. long but sometimes about 1 in., linear to lanceolate, sessile: fls. many, axillary, about ¼ in. long, pedicelled; calyx straight, ribbed, gibbous at base above, flaring at top; petals 6, nearly equal, light violet to white; stamens included. Mex. and Guatemala.

3. *C. miniata*, Brongn. (*C. Llavea*, LaLlave & Lex., var. *miniata*, Koehne). St. shrubby and erect, with few hispid branches: lvs. ovate, 1-3 in. long, acute, short-petioled, the upper not quite opposite, hairy especially beneath: fls. solitary and nearly sessile, subaxillary, forming a leafy few-fl. terminal raceme; calyx-tube about 1 in. long, ribbed and the opening 12-toothed, hispid, green at base and

purplish above, only swollen or somewhat gibbous at base; petals 2, showy, wavy, bright red (varying to white). Mex.

4. *C. Hookeriana*, Walp. (*C. Llavea*, Lindl., not LaLlave & Lex.). Shrubby or subshrubby, 1-2½ ft., erect, scabrous: lvs. lanceolate or linear-lanceolate, 3-4 in. long, long-acuminate, nearly sessile, becoming linear in the infl.: fls. solitary near the axils, slender-pedicelled, forming open few-fl. terminal racemes; calyx ½-1 in. long, straight and rather slender, with an obtuse short spur at base on upper side, more or less red; petals mostly 6, of which 2 are large and prominent, oblong, wavy and deep purple, the other 4 very small or sometimes wanting. (Bears the name of Sir Wm. J. Hooker, 1785-1865, noted English botanist.) Mex.—Some of the large-flowered glasshouse and garden cupheas are apparently derived from this and perhaps No. 3, with possibly other admixtures.

5. *C. Roezlii*, Carr. Strong erect little shrub, 3 ft. or more, with nearly simple pubescent sts.: lvs. opposite, elliptic-lanceolate, 2-3 in. long, sharply long-acuminate, manifestly petioled, very scabrous: fls. small, abundant, about ½ in. or less long, in short axillary racemes; calyx curved, with small spur-like gibbosity above, cinnabar-red with yellowish toward end; petals very small, usually 2. (Collected by Roezl.) Mex.

6. *C. platycentra*, Lem. (*C. ignea*, A. DC.). CIGAR-FLOWER. Common little plant in pots and bedded out, shrubby, much branching and spreading, leafy, nearly or quite glabrous: lvs. lanceolate to ovate-lanceolate, 1-2½ in. long, sharply acuminate, narrowed to distinct petiole: fls. solitary in or near axils, slender-pedicelled, scattered among the lvs.; calyx-tube about ¾ in. long, slender, backward-spurred, 6-toothed, bright red but with dark ring at end and a white mouth (whence the name cigar-plant), ornamental; petals none. Mex.—*C. platycentra*, Benth., is *C. Bustamanta*, LaLlave & Lex., apparently not in cult.

## 121. PUNICACEÆ. POMEGRANATE FAMILY

Small glabrous trees or shrubs, of 1 genus and 2 species native from Medit. region to Himalayas, but the pomegranate through long cult. widely distributed in trop. and subtrop. regions. —Branches often spiny-tipped: lvs. mostly opposite, exstipulate: fls. bisexual, 1-5 together on the tips of axillary shoots; receptacle or calyx-tube campanulate or tubular, leathery, the 5-7 thick sepals persistent on the fr.; petals 5-7, alternate with sepals and inserted on edge of receptacle, wrinkled; stamens many, clothing the inside of the receptacle, the filaments slender; ovary inferior, of several united carpels; style and stigma 1: fr. a thick-skinned spherical several-celled berry, the seeds surrounded by juicy pulp.

**PUNICA**, L. The pomegranate is grown in the S. U. S. for ornament and for the edible frs. and also in the N. as a greenhouse subject.—Characters as for the family. (Pu-nica: *Malum punicum*, "apple of Carthage," an early name for pomegranate.)

**P. Granatum**, L. POMEGRANATE. Deciduous shrub or tree to 20 ft. high: lvs. short-petioled, oblong or oval-lanceolate, 1-2 in. or more long, obtuse, glabrous and shining: fls. orange-red, 1-1½ in. across: fr. about size of an orange, bearing the persistent sepals, brownish-yellow to red, upper and lower portions divided by diaphragm and these separated into several cells, the numerous seeds surrounded by crimson or pink acid pulp. (Granatum: old substantive name.) S. Asia, but naturalized in Medit. region, S. Amer., S. U. S.—There are many named vars., the double-fl. forms being most commonly grown. A dwarf sort is planted in greenhouses.

## 122. LECYTHIDACEÆ. LECYTHIS FAMILY

Trop. trees, of 18 genera and over 230 species native in S. Amer., W. Afr., Malay Peninsula, Mozambique to Samoan Isls.; often planted in the tropics for ornament or the edible nuts, but in N. Amer. known chiefly through the importation of the "nigger-toe" or Brazil-nut.—Lvs. usually large and striking, alternate, often crowded at ends of branches, exstipulate: fls. bisexual, regular, solitary or in racemes, axillary or terminal; sepals and petals usually 4-6 or

sometimes petals lacking; stamens many in several series, more or less united at base, a part sometimes without anthers; intra-staminal disk often present; ovary inferior, 2-6- or more-celled with 1 to many ovules in each cell: fr. a leathery berry or drupe or a caps. dehiscent by a lid, in some species large and heavy, like a pot, and sometimes called "monkey pots."—*Bertholletia excelsa*, Humb. & Bonpl., supplies the Brazil- or Para-Nuts of commerce, called in the trade "castanea": it is a tree to 100 ft. or more high, native in N. Brazil: lvs. leathery, broadly oblong, 1-2 ft. or more long, 4-6 in. wide, undulate at margins: fls. in spike-like racemes, cream-colored, the sepals united but finally tearing into 2 deciduous sepals: fr. globose, dark brown, to 5-6 in. diam., with hard thick walls, inclosing 18-24 triangular nuts 2 in. or more long which have a single solid sweet kernel.

### 123. COMBRETACEÆ. COMBRETUM FAMILY

About 15 genera and 280 species of trees and shrubs rich in tannin, often climbing, mostly confined to the tropics; a few grown for ornament in warm regions and one for its edible nuts.—Lvs. alternate or rarely opposite, petioled, simple and entire, exstipulate: fls. bisexual or rarely unisexual, usually sessile in many-fl. spikes, panicles or heads, bracted at base; receptacle or calyx-tube adnate to ovary and often projecting into slender tube, the sepals 4-5; petals 4-5 or 0, commonly small; stamens inserted on calyx, usually twice as many as sepals and in 2 series; ovary inferior, 1-celled, mostly with as many angles as there are sepals and alternate with them, the ovules 2-5 or seldom more; style 1 and slender: fr. usually dry, 1-seeded, indehiscent or incompletely dehiscent, 2-5-angled, the angles often winged, sometimes crowned by the persistent calyx.

Plant erect: petals 0; receptacle or calyx-tube not produced beyond ovary.....1. *TERMINALIA*  
 Plant climbing or sarmentose: petals 5; receptacle produced into long tube beyond ovary.....2. *QUISQUALIS*

1. *TERMINALIA*, L. Large hard-wooded trees, of over 100 species widely distributed in the tropics, one planted as a street and ornamental tree and for its edible fr.—Lvs. alternate, rarely opposite, often crowded toward ends of branchlets: fls. small, bisexual or polygamo-dicæous, subtended by small deciduous bracts, mostly borne in loose spikes; receptacle or calyx-tube constricted above ovary, the limb 5-parted, campanulate, usually deciduous; petals 0; stamens 10, in 2 series; ovules 2 or rarely 3: fr. an angular drupe, compressed or 2-5-winged. (*Terminalia*: from Latin *terminus*, alluding to the lvs. being borne on the tips of the shoots.)

*T. Catappa*, L. TROPICAL- or INDIAN-ALMOND. *MYROBALAN*. Tall tree to 80 ft. high, with horizontal wide-spreading branches and smooth brownish-gray bark: lvs. obovate, 6-12 in. long, obtuse or abruptly acuminate, short-petioled, becoming rich red before falling: fls. greenish-white, in slender spikes up to 6 in. long: fr. broadly oval, 2 in. or more long, flattened, the 2 angles winged, greenish or reddish: seed oblong-elliptical, often eaten in the tropics and furnishing valuable oil. (*Catappa*: native E. Indian name.) Madagascar, Malaya, E. Indies.

2. *QUISQUALIS*, L. Climbing or semi-climbing shrubs of about 4 species in trop. Asia and Afr., one widely grown for ornament in tropics and sometimes in the greenhouse N.—Lvs. opposite: fls. showy, in short axillary or terminal spikes, bisexual; receptacle or calyx-tube prolonged into a long slender tube above ovary, deciduous, with 5 small spreading or recurved sepals; petals 5; stamens 10; ovules 3 or 4: fr. dry and leathery, 5-angled or 5-winged, dehiscent at top along angles. (*Quisqualis*: Latin *who, what*, the application variously interpreted.)



*Q. indica*, L. RANGOON-CREEPER. Rapid-growing scandent deciduous shrub, the young parts rusty-pubescent: lvs. oblong-lanceolate to elliptic, 3-5 in. long, acuminate, the lower part of the petiole persistent and becoming hard and thorn-like: fls. fragrant, in terminal drooping spikes, the green slender calyx-tube about 3 in. long with short triangular lobes; petals white, changing to red: fr. narrowly ellipsoid, about 1 in. long, 5-angled. Burma, Malaya, New Guinea, Philippines; now commonly planted in trop. and sub trop. countries.

## 124. MYRTACEÆ. MYRTLE FAMILY

Seventy-two genera and probably 3,000 species of woody plants, as now defined, with aromatic fragrance, native in the tropics, particularly in trop. Amer. and Australia; many grown for ornament, park and avenue trees in warm regions, and some of them for edible frs.; one of the distinctive families.—Lvs. usually opposite, evergreen, thick and mostly entire, short-petioled, exstipulate, more or less pellucid-punctate: fls. bisexual, regular, solitary in the axils or in corymbs or racemes, usually bracted; receptacle or calyx-tube more or less adnate to the ovary and often elongated, the 4-5 sepals usually free, persistent on fr.; petals 4-5, imbricated, or rarely lacking; stamens mostly numerous, often in fascicles opposite the petals, the filaments distinct or partially united; ovary inferior, 1- to many-celled, with 1 to many ovules in each cell, the style simple: fr. a berry, drupe, caps., or nut.

- A. Infl. various, but not resembling a bottle-brush.
- B. Petals and sepals distinct.
- C. Stamens free.
- D. Fr. an indehiscent berry or drupe.
- E. Ovary usually 1-3-celled.
- F. Lvs. pinnate-veined: cells of ovary not divided by false partitions; ovules 1 to many in each cell.
- G. Ovules not pendulous.
- H. Embryo curved or spiral..... 1. MYRTUS
- HH. Embryo straight..... 2. EUGENIA
- GG. Ovules pendulous from apex of cell..... 3. PIMENTA
- FF. Lvs. (in following species) 3-nerved from base: cells of ovary divided into numerous 1-ovuled superimposed compartments..... 4. RHODOMYRTUS
- EE. Ovary usually 4-5-celled.
- F. Lvs. white-tomentose below: stamens much longer than petals..... 5. FEIJOA
- FF. Lvs. not white-tomentose below: stamens about length of petals..... 6. PSIDIUM
- DD. Fr. a dehiscent caps.
- E. Lvs. opposite: fls. in dense terminal, rarely axillary cymes... 7. METROSIDEROS
- EE. Lvs. alternate.
- F. Fls. solitary or 2-3 together..... 8. LEPTOSPERMUM
- FF. Fls. in heads..... 9. AGONIS
- CC. Stamens united into fascicles opposite the petals.
- D. Anthers basifixed: lvs. needle-like..... 10. CALOTHAMNUS
- DD. Anthers versatile: lvs. not needle-like..... 11. TRISTANIA
- BB. Petals and calyx-lobes united to form a lid or cap which dehisces transversely..... 12. EUCALYPTUS
- AA. Infl. resembling a bottle-brush, the fls. in contiguous heads or spikes near ends of branches, each fl. sessile in axil of deciduous floral lf.
- B. Stamens free..... 13. CALLISTEMON
- BB. Stamens united into bundles opposite the petals..... 14. MELALEUCA

1. MYRTUS, L. MYRTLE. Perhaps 100 species of shrubs or rarely trees, of wide distribution, one grown out-of-doors in warm regions and as a greenhouse subject N.—Lvs. opposite, pinnately-veined, entire: fls. solitary in the axils or in few-flid. cymes; receptacle or calyx-tube turbinate, with 4-5 sepals; petals 4-5, spreading; stamens numerous, in several series, free, longer than petals, anthers versatile; ovary 2-3-celled with many ovules in each cell: berry globose or ovoid, crowned by persistent calyx-lobes, the 1 to several seeds reniform, with a curved or spiral fleshy embryo. (Myrtus: ancient Greek name.)

M. communis, L. The classic MYRTLE. Evergreen strong-scented shrub from 3-10 ft. high: lvs. ovate to lanceolate, 1-2 in. long, acute, smooth and shining, very

short-petioled: fls. white or tinged with rose,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, on slender pedicels  $\frac{3}{4}$ –1 in. long: berry bluish-black (white in one var.), about  $\frac{1}{2}$  in. long. W. Asia, Medit. region.—Runs into many forms differing chiefly in stature, shape and size of lvs., and there is also a var. with variegated lvs. Var. *microphylla*, Hort., has small linear-lanceolate long-pointed lvs. close together, ascending, and more or less imbricated.

2. **EUGENIA**, L. Nearly 1,000 species if the genus is defined broadly, of wide distribution in the tropics; evergreen trees or shrubs, often planted for ornament in warm regions, some yielding edible frs. and one the clove of commerce.—Very closely allied to *Myrtus* and separated on only one character, the 1 or few seeds having a straight fleshy embryo. By many authors the genera *Jambosa* and *Syzygium* are kept distinct, but the characters are not sufficiently definite to warrant the separation. (Eugenia: after Prince Eugene of Savoy, 1663–1736, patron of botany and hort.)

- Peduncles 1-fld. .... 1. *E. uniflora*
- Peduncles several-fld. .... 2. *E. apiculata*
- Lvs. very small, less than 1 in. long. .... 2. *E. apiculata*
- Lvs. more than 1 in. long. .... 3. *E. Curranii*
- Infl. from tubercles on st. .... 3. *E. Curranii*
- Infl. not from tubercles. .... 4. *E. Jambos*
- Petals free. .... 5. *E. myrtifolia*
- Fls.  $2\frac{1}{2}$ –3 in. or more across. .... 5. *E. myrtifolia*
- Fls. about 1 in. across. .... 6. *E. aromatica*
- Fls. about  $\frac{1}{4}$  in. across. .... 6. *E. aromatica*
- Petals united into a calyptra. .... 7. *E. operculata*
- Lateral veins of lvs. few and distant. .... 7. *E. operculata*
- Lateral veins close together. .... 8. *E. Jambolana*

1. ***E. uniflora***, L. PITANGA. SURINAM-CHERRY. Broad compact glabrous shrub or small tree to 25 ft. high: lvs. nearly sessile, ovate to ovate-lanceolate, 1–2 in. long, acuminate, rounded at base, dark green and shining above: fls. solitary on the ends of long slender peduncles which are 1 or several together in the axils of lvs., about  $\frac{1}{2}$  in. across, white, slightly fragrant: berry oblate,  $\frac{1}{2}$ –1 in. diam., conspicuously 8-ribbed, deep crimson when ripe, 1–2-seeded, edible, having spicy flavor. Brazil.

2. ***E. apiculata***, DC. Lvs. oval, small, 1 in. or less long, ending in short-pointed tips, short-petioled, glabrous above: fls. on axillary peduncles about length of lvs., 3 together, the middle one sessile and the lateral pedicelled, about  $\frac{1}{2}$  in. across, white: berry black. Chile.

3. ***E. Curranii***, C. B. Robinson. Glabrous tree to nearly 50 ft. high, the branches 4-angled: lvs. oblong- or narrow-elliptic, 6–12 in. long, short-petioled, with short point at tip, slightly cordate at base: fls. in 5–7-fld. panicles, one or several from tubercles on the st.: berry about size of grape, acid and edible. Philippine Isls.

4. ***E. Jambos***, L. (*Jambosa vulgaris*, DC. *Caryophyllus Jambos*, Stokes). ROSE-APPLE. Attractive glabrous tree to 30 ft. high: lvs. oblong-lanceolate, 5–8 in. long, acuminate, thick and shining, short-petioled: fls. greenish-white, in short terminal corymbs,  $2\frac{1}{2}$ –3 in. or more across, the numerous stamens much surpassing the petals: berry round or oval, 1–2 in. long, greenish or yellow, 1–2-seeded, edible, used for preserves. (Jambos: native Malayan name.) E. Indies; naturalized in W. Indies and Hawaii.

5. ***E. myrtifolia***, Sims (*E. australis*, Wendl. *Jambosa myrtifolia*, Niedz.). AUSTRALIAN BRUSH-CHERRY. Glabrous tree to 40 ft. or more high, often grown as hedge and kept clipped: lvs. oval or oblong-lanceolate,  $1\frac{1}{2}$ –3 in. long, obtuse or acuminate, cuneate at base, short-petioled, tinged with red when young: fls. white, about 1 in. across, in branching axillary panicles or terminal on ends of short branchlets, the peduncles 3–5- or more-fld.: fr. ovoid, nearly 1 in. long, purplish or reddish, sometimes used in jelly. Australia.

6. ***E. aromatica***, Baill., not Berg. (*E. caryophyllata*, Thunb. *Caryophyllus aromaticus*, L. *Jambosa Caryophyllus*, Niedz.). CLOVE-TREE. Tree to 30 ft. high: lvs. ovate-oblong, 2–5 in. long, acute, tapering at base: fls. pale purple, about  $\frac{1}{4}$  in. across, in terminal branching cymes. Moluccas.—The fl.-buds, when dried in the sun, furnish the cloves of commerce.

7. ***E. operculata***, Roxb. (*Syzygium operculatum*, Niedz.). Glabrous tree to 50 ft. high: lvs. broad-ovate or elliptic, 3–8 in. long, rounded or shortly acuminate at

apex, on petioles about  $\frac{1}{2}$  in. long, the primary lateral veins few and distant: fls. small, white, in branched cymes, the peduncles 3-fld.: berry globular,  $\frac{1}{2}$  in. or less across, purplish-black, edible. Himalayas.

8. *E. Jambolana*, Lam. (*Syzygium Jambolanum*, DC. *S. Cumini*, Skeels). JAMBOLAN or JAMBOLAN-PLUM. Glabrous tree 50–80 ft. high, the branchlets white: lvs. broadly oblong or oval, 2–5 in. long, bluntish-acuminate, on petioles  $\frac{1}{2}$ –1 in. long, the lateral veins very close together: fls. small, white, in branched cymes, the peduncles 3- or more-fld.: berry oval, about  $\frac{1}{2}$  in. long, purplish-red, edible. (Jambolana: from native Malayan name.) E. Indies, Burma.

3. **PIMENTA**, Lindl. Very aromatic trees, of about 5 species in trop. Amer., one yielding allspice which is used in cookery and medicine.—Closely allied to Myrtus and Eugenia, differing chiefly in its 2-celled ovary with 1–6 ovules pendulous from the apex of cell, and from Eugenia in its spiral embryo: fls. small, in many-fld. cymes in the upper axils. (Pimen-ta: from Spanish name *pimento*.)

Calyx-lobes 4.....1. *P. officinalis*  
Calyx-lobes 5.....2. *P. acris*

1. *P. officinalis*, Berg. (*Eugenia Pimenta*, DC.). ALLSPICE. PIMENTO. Tree to 40 ft. high: lvs. leathery, oblong to oblong-lanceolate, to 6 in. long, the veins prominent beneath, petioles about  $\frac{1}{2}$  in. long: fls. white, about  $\frac{1}{4}$  in. across, the calyx 4-lobed: fr. globose, about  $\frac{1}{2}$  in. across, dark brown. W. Indies, Cent. Amer.—Allspice is the unripe berry when dried.

2. *P. acris*, Kostel. (*Amomis caryophyllata*, Krug & Urban). BAY- or BAY-RUM-TREE. To 25 ft. high: lvs. leathery, obovate or elliptic, to 5 in. long, obtuse, finely reticulate-veined, short-petioled: fls. white, the calyx 5-lobed: fr. ovoid, about  $\frac{1}{2}$  in. long. W. Indies, Venezuela, Guiana.—Bay oil or oil of myrica is distilled from the lvs., which is used in the preparation of bay-rum.

4. **RHODOMYRTUS**, DC. Six species of trees or shrubs native in Australia, trop. Asia and E. Indies, one grown for its edible fr.—Lvs. opposite, pinnate-veined or 3–5-nerved from the base: fls. rather large, on axillary 1–3-fld. peduncles or rarely in short racemes; receptacle or calyx-tube turbinate, the 4–5 lobes persistent; petals 4–5, spreading; stamens numerous, free, the anthers versatile or basifixed; ovary 1–3-celled, with 2 rows of ovules in each cell, divided by false partitions between the cells into numerous 1-ovuled superimposed compartments: fr. a globose or ovoid berry. (Rhodomyr-tus: Greek *rose-myrtle*, alluding to rose-colored fls.)

*R. tomentosa*, Wight. DOWNY-MYRTLE. HILL-GOOSEBERRY. Shrub to 5 ft. high, the young branchlets tomentose: lvs. elliptic or obovate, 1  $2\frac{1}{2}$  in. long, obtuse, pubescent below, short-petioled: fls. 1–3 on slender pedicels, rose-pink, about  $\frac{3}{4}$  in. across, the calyx and outside of petals tomentose: berry globose,  $\frac{1}{2}$  in. across, purple, edible, used for making pies and jam. Ceylon to S. China, Japan, and Philippines.

5. **FEIJOA**, Berg. (*Orthostemon*, Berg.). Two species of shrubs or small trees native in S. Amer., one planted in warm countries for its edible fr. and also for ornament.—Lvs. opposite, pinnate-veined, white-tomentose beneath: fls. solitary, axillary, long-pedicelled; receptacle or calyx-tube elongated, lobes 4; petals 4, spreading; stamens many in several series, long-exserted, anthers versatile; ovary 4-celled with several ovules in each cell, the style as long as stamens: fr. an oblong berry, crowned by persistent calyx-lobes. (Feijo-a: after J. da Silva Feijo, Director Natural History Museum at San Sebastian.)

*F. Sellowiana*, Berg. To 18 ft. high: lvs. oval-oblong to elliptic, 2–3 in. long, obtuse or acute, glossy-green above and silvery-gray beneath: fls. 1–1 $\frac{1}{2}$  in. across, the petals white-tomentose outside and purplish within, the stamens and style dark red: fr. round, oval or oblong, 1–3 in. long, dull green sometimes tinged with red, with whitish bloom, the whitish flesh surrounding a jelly-like pulp in which the seeds are embedded. (Named after Friedrich Sellow, died 1831, German traveler in S. Amer.) S. Brazil, Paraguay, Uruguay, Argentina.

6. **PSIDIUM**, L. About 150 species of trees and shrubs native in trop. and subtrop. Amer., the guava widely cult. for its edible fr.—Lvs. opposite, glabrous or tomentose, pinnate-veined: fls. usually large, on axillary or lateral, mostly 1-3-fl'd., peduncles; receptacle or calyx-tube campanulate or pyriform, the lobes 4-5, often closed before flowering and splitting irregularly; petals 4-5, spreading; stamens numerous, in many series, free, inserted on disk; ovary usually 4-5-celled, with many ovules in each cell: fr. a globose or pyriform berry, crowned with the persistent calyx-lobes. (*Psidium*: from *psidion*, Greek name of the pomegranate.)

Young branchlets 4-angled: veins of lvs. conspicuously impressed above and raised below:.....1. *P. Guajava*  
 Young branchlets terete: veins of lvs. not prominent:.....2. *P. Cattleianum*

1. **P. Guajava**, L. **GUAVA**. Shrub or small tree to 30 ft. high, the bark scaly and greenish-brown; young branchlets 4-angled: lvs. oblong-elliptic to oval, 3-6 in. long, acute or rounded at apex, finely pubescent below, the veins conspicuously impressed above and raised below: fls. white, about 1 in. across, solitary or 2-3 together on slender peduncles, the stamens about length of petals: fr. globose, ovoid or pyriform, 1-4 in. long, commonly yellow with white, yellow or deep pink flesh. (*Guajava*: from *guayaba*, the Spanish name in trop. Amer.) Trop. Amer.; naturalized in Hawaii.

2. **P. Cattleianum**, Sabine. **STRAWBERRY GUAVA**. Bushy shrub or small tree to 25 ft. high, with smooth gray-brown bark; young branchlets terete: lvs. elliptic to obovate, 2-4 in. long, acute, glabrous, thick and leathery, the veins not conspicuously impressed: fls. white, about 1 in. across, solitary: fr. obovate to globose, 1-1½ in. long, purplish-red (yellow in var. *lucidum*), the flesh white. (Named after William Cattley, died 1832, English horticulturist; page 212.) Brazil.

7. **METROSIDEROS**, Banks. Trees or shrubs, sometimes climbing, of about 20 species in New Zeal., Australia, the Pacific Isls., and 1 in S. Afr., a few planted for ornament.—Lvs. mostly opposite, pinnate-veined: fls. showy, in terminal or rarely axillary branched cymes; receptacle or calyx-tube campanulate or turbinate, the lobes 5; petals 5, spreading; stamens many, in 1 or several rows, free, much longer than petals, anthers versatile; ovary 3-celled with many ovules in each cell, the style very long: fr. a leathery caps. nearly or quite inclosed in the persistent calyx-tube, usually loculicidally dehiscent by 3 valves. (*Metrosideros*: Greek *heart* and *iron*, referring to the hardness of the wood.)

Lvs. glabrous beneath:.....1. *M. robusta*  
 Lvs. white-tomentose beneath:.....2. *M. tomentosa*

1. **M. robusta**, A. Cunn. Large round-headed tree to 100 ft.: lvs. leathery and glabrous, ovate-oblong to elliptic-lanceolate, 1-1½ in. long, obtuse: fls. dark red, in dense terminal cymes: caps. oblong, about ¼ in. long, the lower half only inclosed in calyx-tube, above loculicidally dehiscent. New Zeal.

2. **M. tomentosa**, A. Rich. Much-branched tree to 70 ft. high: lvs. leathery, variable, lanceolate to broad-oblong, 2-4 in. long, acute or obtuse, usually white-tomentose beneath: fls. dark red, in dense terminal cymes, calyx densely white-tomentose: caps. about ½ in. long, half-superior, tomentose, upper half dehiscent. New Zeal.

8. **LEPTOSPERMUM**, Forst. Shrubs or rarely small trees, of about 25 species in Australia, New Zeal., and Malay Archipelago, a few grown for ornament out-of-doors in warm regions or in greenhouses N.—Lvs. alternate, small and rigid, 1-3-nerved or nerveless: fls. solitary or 2-3 together in the axils or at the ends of short branchlets; receptacle or calyx-tube usually broadly campanulate, the lobes 5; petals 5, spreading; stamens many, free, in 1 series, about length of petals, the anthers versatile; ovary 5- to many-, rarely 3-4-celled, with few to many ovules in each cell: fr. a leathery caps. loculicidally dehiscent at top. (*Leptospermum*: Greek for *slender seed*.)



- Lvs. obtuse,  $\frac{1}{2}$ –1 in. long; caps. 8–10-celled. .... 1. *L. lævigatum*  
 Lvs. acute,  $\frac{1}{2}$  in. or less long; caps. 5-celled. .... 2. *L. scoparium*

1. *L. lævigatum*, F. Muell. Glabrous and somewhat glaucous shrub to 30 ft. high: lvs. obovate-oblong to narrow-oblong,  $\frac{1}{2}$ –1 in. long, obtuse, 3-nerved: fls. white,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, the calyx glabrous: caps. about  $\frac{1}{4}$  in. long, nearly flat above the insertion of calyx-lobes and dehiscent into 8–10 cells on top. Australia.—Extensively planted for the reclamation of moving sands.

2. *L. scoparium*, Forst. Shrub to 6 ft. or more high: lvs. linear or linear-lanceolate to oval,  $\frac{1}{2}$  in. or less long, acute and pungent-tipped, silky beneath when young: fls. white,  $\frac{1}{4}$ – $\frac{1}{2}$  in. across: caps. dehiscent at top into 5 cells. New Zeal.

9. *AGONIS*, DC. About a dozen Australian shrubs or small trees, one sometimes planted in Calif.—Differs from *Leptospermum* chiefly in the fls. being in dense globose sessile heads and the 3-celled ovary, each cell with 2–6 ovules ascending from a basal placenta. (Ago-nis: Greek for *gathering*, referring to the many seeds.)

*A. flexuosa*, Schauer (*Leptospermum flexuosum*, Spreng.). Shrub or tree attaining 40 ft.: lvs. willow-like, lanceolate or linear-lanceolate, 2–6 in. long, tapering at both ends, 3-nerved: fls. white, in axillary heads to  $\frac{1}{2}$  in. across, with pubescent calyx and usually 20 stamens. W. Australia.

10. *CALOTHAMNUS*, Labill. Nearly 25 species of shrubs native in W. Australia, one sometimes grown for ornament in Calif.—Lvs. scattered, terete or flat, rigid, 1-nerved or nerveless: fls. showy, in clusters or often unilateral spikes, sometimes immersed in the rachis; receptacle or calyx-tube campanulate, the 4–5 lobes persistent or deciduous; petals 4–5, spreading, deciduous; stamens many, united into fascicles opposite the petals and much exceeding them, the anthers basifixed; ovary 3-, rarely 4-celled, with many ovules in each cell: fr. a caps. inclosed in the hardened and enlarged calyx-tube, loculicidally dehiscent by 3–4 valves. (Calotham-nus: Greek for *beautiful bush*.)

*C. quadrifidus*, R. Br. Erect shrub to 8 ft. high: lvs. heath-like, terete or slightly flattened,  $\frac{1}{2}$ –1 in. long: fls. sessile in clusters, calyx-lobes and petals 4; staminal bundles rich crimson, nearly equal,  $\frac{3}{4}$ –1 in. long: caps. with 2 connivent calyx-lobes.

11. *TRISTANIA*, R. Br. Trees or tall shrubs sometimes planted for ornament in warm countries, nearly 25 species in Australia, New Caledonia, and Malay Archipelago.—Lvs. alternate or whorled at ends of branches: fls. in peduncled axillary cymes; receptacle or calyx-tube turbinate-campanulate, the 5 lobes short; petals 5, spreading; stamens many, in fascicles opposite the petals, the anthers versatile; ovary 3-celled with many ovules in each cell: fr. a caps. completely or partially inclosed in persistent calyx, loculicidally dehiscent by 3 valves. (Trista-nia: after Jules M. C. Tristan, 1776–1861, French botanist.)

*T. conferta*, R. Br. BRISBANE-BOX. Tree to 150 ft.: lvs. ovate-lanceolate, 3–6 in. long, glabrous, usually crowded at ends of branches: fls. white, about  $\frac{3}{4}$  in. across, in 3–7-fld. cymes, usually on young wood below clusters of lvs.; calyx pubescent: caps. nearly  $\frac{1}{2}$  in. diam., scarcely exceeding the calyx-tube. Australia.

12. *EUCALYPTUS*, L'Her. GUM-TREE. About 300 species of trees native in Australia and the Malayan region, furnishing valuable timber and a number grown for street and avenue trees in semitrop. and warm temp. regions.—Lvs. mostly alternate and vertical, rigid, pinnate-veined, entire, those on young shoots of many species opposite, horizontal, sessile and cordate: fls. 3 or more together or rarely solitary, in umbels or heads; receptacle or calyx-tube turbinate or campanulate, adnate to ovary at base, the free part entire or remotely 4-toothed; petals united with calyx-lobes to form a lid or cap which dehisces transversely; stamens many, in several series, usually free; ovary 3–6-

celled with numerous ovules in each cell: fr. a caps. wholly or partially inclosed in the calyx-tube, loculicidally dehiscent at top by 3-6 valves. (Eucalyptus: from Greek for *well* and *calyptra* or lid, referring to the sepals and petals which are united to form a cap.)—Many species are offered in Calif., but only those sold in "flats" for large plantings are here described. To describe all the eucalypts likely to be grown in parks would be to make a monograph of the genus. The following species are Australian.

- A. Infl. a many-fld. panicle.
  - B. Fls. very large, 1-1½ in. long..... 1. *E. ficifolia*
  - BB. Fls. smaller, ¼-½ in. long.
    - C. Lvs. prevailing orbicular to ovate..... 2. *E. polyanthemos*
    - CC. Lvs. lanceolate.
      - D. Fr. almost ½ in. across..... 3. *E. maculata*
      - DD. Fr. about ½ in. across..... 4. *E. crebra*
- AA. Infl. a stalked umbel, or sometimes fls. solitary and sessile in No. 5.
  - B. Fl.-stalks flattened.
    - C. Fr. ¾-1 in. across, angular: lid warty, shorter than calyx-tube..... 5. *E. globulus*
    - CC. Fr. to ½ in. across, not angular: lid not warty, as long as or longer than calyx-tube..... 6. *E. robusta*
  - BB. Fl.-stalks not flattened, although perhaps somewhat angular.
    - C. Pedicels shorter than calyx-tube.
      - D. Fr. contracted at mouth, caps. deeply sunk..... 7. *E. cladocalyx*
      - DD. Fr. truncate, caps. not sunk..... 8. *E. viminalis*
    - CC. Pedicels as long as or longer than calyx-tube.
      - D. Fr.-valves plainly exserted.
        - E. Lid two to four times longer than calyx-tube..... 9. *E. tereticornis*
        - EE. Lid (without point or beak) about length of calyx-tube.
          - F. Caps. not sunk: lid usually ending in abrupt point or beak..... 10. *E. rostrata*
          - FF. Caps. somewhat sunk but convex in center: lid conical..... 11. *E. rudis*
      - DD. Fr.-valves not exserted.
        - E. Bark smooth, pale, deciduous..... 12. *E. leucorxylon*
        - EE. Bark rough, dark red or black, persistent..... 13. *E. sideroxylon*

1. *E. ficifolia*, F. Muell. SCARLET-FLOWERING GUM. Ornamental tree to 30 ft. or more high, with dark furrowed bark: lvs. thick, ovate to lanceolate, the veins almost transverse: fls. very large, 1-1½ in. long, long-pedicelled, usually bright scarlet but varying to pink and also a white var., borne in many-fld. panicles; lid thin and nearly flat: fr. very thick and woody, ovate-urn-shaped, 1-1½ in. across, the caps. deeply sunk.

2. *E. polyanthemos*, Schauer. RED-BOX. AUSTRALIAN-BEECH. Often irregular tree from 40-150 ft. high, with brown or gray persistent bark which becomes rough with age: lvs. prevailing orbicular to ovate and obtuse, rarely ovate-lanceolate, dull grayish-green: fls. small, about ¼ in. long, on pedicels about length of calyx-tube, white, borne in many-fld. close panicles; lid conical, obtuse: fr. goblet-shaped, not contracted at mouth, nearly ½ in. across, the caps. sunk. (*Polyanthemos*: Greek *many fls.*)

3. *E. maculata*, Hook. SPOTTED GUM. Tall tree to 150 ft. with column-like trunk, the whitish or reddish-gray bark deciduous in patches, giving the trunk a spotted appearance: lvs. lanceolate: fls. about ½ in. long, on thick pedicels, usually in clusters of 3 in a many-fld. panicle; lid hemispherical, much shorter than calyx-tube: fr. globular-urn-shaped, nearly ½ in. across, the caps. deeply sunk.—Cult. mostly in its var. *citriodora*, Bailey (*E. citriodora*, Hook.), LEMON-SCENTED GUM, in which the foliage is strongly lemon-scented.

4. *E. crebra*, F. Muell. NARROW-LEAVED IRONBARK. Small to large tree with slender drooping branchlets, the persistent bark hard and dark, deeply furrowed: lvs. linear-lanceolate: fls. small, less than ¼ in. long, short-pedicelled, in many-fld. panicles; lid conical or hemispherical, almost ½ in. long: fr. obovoid-truncate, not over ¼ in. across, the caps. sunk, but the valves sometimes slightly protruding.

5. *E. globulus*, Labill. BLUE GUM. Tall tree attaining 300 ft., widely grown for ornament and timber, the bark deciduous in long strips or sheets and leaving the trunk smooth grayish or bluish-white: lvs. lanceolate, those on the young shoots opposite, sessile, cordate and usually glaucous-white: fls. large, about 1½ in. across, solitary or 2-3 together, sessile or on short flattened peduncles; calyx-tube and lid hard and warty, covered with bluish-white wax, the lid conical in center, shorter than calyx-tube: fr. angular, ¾-1 in. across, the broad flat-topped rim projecting but the flat valves not exserted. (*Globulus*: old substantive name

meaning *little globe*, here used in apposition.)—Var. **compacta**, Hort., is a densely branched dwarf form.

6. *E. robusta*, Sm. SWAMP-MAHOGANY. Slow-growing tree with rough dark brown persistent bark: lvs. ovate-lanceolate, long-pointed: fls. about  $\frac{3}{4}$  in. across, on thick pedicels, 4–12 together in an umbel having a stout flattened peduncle; lid acuminate, as long as or longer than calyx-tube: fr. goblet-shaped, about  $\frac{1}{2}$  in. across, the caps. much sunk.

7. *E. cladocalyx*, F. Muell. (*E. corynocalyx*, F. Muell.). SUGAR GUM. Tree to 120 ft., with smooth bark deciduous in age: lvs. ovate-lanceolate to lanceolate: fls. about  $\frac{1}{2}$  in. across, on pedicels shorter than calyx-tube, 6–12 or more together in a peduncled umbel; lid very short and nearly flat: fr. ovoid, about  $\frac{1}{2}$  in. long and  $\frac{1}{4}$  in. across, often strongly ribbed, the caps. deeply sunk.

8. *E. viminalis*, Labill. MANNA GUM. Tree to 300 ft., with pendulous branches, the bark rough dark-colored and persistent or smooth grayish-white and deciduous: lvs. lanceolate: fls. nearly  $\frac{1}{2}$  in. across, on pedicels shorter than calyx-tube, 3–8 together in a stalked umbel; lid nearly conical, as long as or slightly longer than calyx-tube: fr. subglobose-truncate,  $\frac{1}{4}$  in. or more across, the rim flat but becoming rounded, caps. not sunk and valves sometimes protruding.

9. *E. tereticornis*, Sin. GRAY or SLATY GUM. To 150 ft. high, the gray bark smooth and deciduous in thin layers: lvs. lanceolate: fls. about  $\frac{3}{4}$  in. across, on pedicels about length of calyx-tube, 4–8 together in a stalked umbel; lid slenderly conical, acuminate, two to four times longer than calyx-tube: fr. obovoid or subglobose,  $\frac{1}{4}$  in. or more across, caps. not sunk, the valves exserted and rim prominent.—A form having large roundish lvs. when young is *E. amplifolia*, Naud.

10. *E. rostrata*, Schlecht. RED GUM. Red-wooded tree to 200 ft., with smooth gray bark deciduous in thin layers: lvs. narrowly lanceolate: fls.  $\frac{1}{4}$ – $\frac{1}{2}$  in. across, on pedicels as long as calyx-lobes, 4–8 together in a stalked umbel; lid usually with narrowed point or beak, about length of calyx-tube (without beak): fr. nearly globular, about  $\frac{1}{4}$  in. across, caps. not sunk, the valves exserted and rim broad and prominent.

11. *E. rudis*, Endl. DESERT GUM. To nearly 100 ft. high, with gray persistent bark rough but not deeply furrowed: lvs. ovate- to narrow-lanceolate: fls. about  $\frac{1}{2}$  in. across, on pedicels about length of calyx-tube, 4–8 together in a stalked umbel; lid conical, not beaked, about as long as calyx-tube: fr. broadly turbinate, nearly  $\frac{1}{2}$  in. across, the caps. somewhat sunk but convex in center and valves exserted.

12. *E. leucoxylon*, F. Muell. WHITE IRONBARK. Bark smooth, pale to dark gray, deciduous in strips: lvs. narrow-lanceolate, grayish or dull green, the young lvs. ovate and sessile: fls. about 1 in. across, on pedicels as long as or longer than calyx-tube, 3 or more together in stalked umbels; lid conical, about length of calyx-tube: fr. ovoid, truncate, nearly  $\frac{1}{2}$  in. across, the rim thick and caps. slightly sunk. (*Leucoxylon*: Greek *white wood*.)—There is a form with bright purple fls., var. *purpurea*, Hort.

13. *E. sideroxylon*, A. Cunn. (*E. leucoxylon* var. *sideroxylon*, Auth.). RED IRONBARK. Closely resembling *E. leucoxylon*, but differing in the rough persistent dark red or black bark, the young lvs. linear-lanceolate. (*Sideroxylon*: Greek *iron wood*.)—Forms with rose-colored fls. are vars. *rosea*, Hort., and *pallens*, Auth., the latter also with silvery-gray foliage.

13. **CALLISTEMON**, R. Br. BOTTLE-BRUSH. About 25 Australian species of shrubs or small trees, planted for ornament in warm countries and sometimes in greenhouses.—Lvs. scattered, terete, linear or lanceolate: fls. in contiguous heads or spikes near ends of branches, each fl. sessile in axil of deciduous floral lf., in infl. resembling a bottle-brush; receptacle or calyx-tube ovoid or campanulate, the 5 lobes deciduous; petals 5, spreading, deciduous; stamens many in several series, free or rarely shortly united at base, much longer than petals, the anthers versatile; ovary 3–4-celled with many ovules in each cell: fr. a caps. inclosed in the calyx-tube, loculicidally dehiscent at top. (*Callistemon*: Greek for *beauty* and *stamen*.)—The species resemble each other very closely and are difficult of determination, particularly as there are apparent hybrids. The genus needs further study.

Anthers dark colored.

Lvs.  $\frac{1}{4}$  in. or more across. .... 1. *C. lanceolatus*

Lvs.  $\frac{1}{2}$  in. across. .... 2. *C. rigidus*

Anthers yellow.

Stamens shortly united at base: spikes very dense.....3. *C. speciosus*

Stamens quite free: spikes not very dense.....4. *C. coccineus*

1. *C. lanceolatus*, DC. (*Metrosideros semperflorens*, Lodd.). Shrub to 12 ft. high (30 ft. in wild), with erect or spreading branches: lvs. lanceolate, 1-3 in. long and  $\frac{1}{4}$  in. or more wide, acute, rigid, the midvein and lateral nerves prominent: spikes not very dense, 2-4 in. long, the stamens bright red, about 1 in. long: caps. ovoid, contracted at summit. Australia.—Often known to the trade as *Metrosideros floribunda*.

2. *C. rigidus*, R. Br. (*C. linearifolius*, DC.). Lvs. linear, 2-5 in. long and about  $\frac{1}{8}$  in. wide, rigid, sharp-pointed, the midvein and marginal veins prominent: spikes dense, the stamens 1 in. or more long, red. New S. Wales.—*C. linearis*, DC., may only be a var. of this species; its lvs. are very narrow and channeled above.

3. *C. speciosus*, DC. Shrub or small tree sometimes 40 ft. high: lvs. lanceolate, 3-4 in. long, about  $\frac{1}{4}$  in. wide, obtuse or acute, midvein prominent but lateral veins obscure: spikes very dense, to 5 in. long, the stamens rich red, about 1 in. long and shortly united at base into clusters opposite the petals, the anthers yellow: caps. globular, truncate at top and little contracted. W. Australia.

4. *C. coccineus*, F. Muell. Lvs. 1-1 $\frac{1}{2}$  in. long, sharp-pointed, the midvein and marginal veins prominent: spikes not very dense, the stamens  $\frac{3}{4}$ -1 in. long, red with yellow anthers: caps. contracted at summit. S. Australia.

14. MELALEUCA, L. BOTTLE-BRUSH. Over 100 species of Australian trees and shrubs, many grown for ornament in warm regions, some furnishing timber, and others used for fixing muddy shores.—Closely allied to Callistemon and differing chiefly in the stamens which are united in 5 bundles opposite the petals. (Melaleuca: from Greek for *black* and *white*, from the black trunk and white branches of one of the species.)

A. Lvs. 2 or more in. long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. wide, flat ..... 1. *M. Leucadendra*  
AA. Lvs. less than 2 in. long,  $\frac{1}{4}$  in. or less wide.

B. Fls. red.

c. Length of lvs.  $\frac{1}{4}$ - $\frac{1}{2}$  in. .... 2. *M. Wilsonii*

cc. Length of lvs.  $\frac{3}{4}$ -1 $\frac{3}{4}$  in. .... 3. *M. hypericifolia*

BB. Fls. white, lilac, or pink.

c. Length of lvs. usually more than  $\frac{1}{2}$  in.

d. Width of lvs. about  $\frac{1}{4}$  in.

E. Base of lvs. broadly-ovate: fls. creamy-white. .... 4. *M. styphelioides*

EE. Base of lvs. tapering: fls. pink. .... 5. *M. nesophila*

DD. Width of lvs.  $\frac{1}{2}$  in. .... 6. *M. linariifolia*

DD. Width of lvs.  $\frac{1}{4}$  in. or less. .... 7. *M. armillaris*

CC. Length of lvs. usually less than  $\frac{1}{2}$  in.

d. Shape of lvs. ovate, broadest at base. .... 8. *M. Huegelii*

DD. Shape of lvs. linear or lanceolate, not broadest at base.

E. Calyx with broad base partly embedded in st. at maturity.

F. Color of fls. lilac. .... 9. *M. decussata*

FF. Color of fls. yellowish-white. .... 10. *M. ericifolia*

EE. Calyx narrowed at base. .... 11. *M. parviflora*

1. *M. Leucadendra*, L. CAJUPUT-TREE. PUNK-TREE. Large tree with thick spongy bark, the branches often pendulous: lvs. elliptic or oblong, 2-4 in. or more long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. wide, tapering at both ends, with 3-7 parallel veins and numerous cross-veinlets: fls. creamy-white, in terminal spikes 2-6 in. long, the axis growing into a leafy shoot after flowering; staminal bundles nearly  $\frac{1}{2}$  in. long, with 5-8 filaments at end: caps. nearly hemispherical, about  $\frac{1}{8}$  in. across. (*Leucadendra*, *Leucadendron*: Greek combination meaning *white tree*.)

2. *M. Wilsonii*, F. Muell. Tall shrub: lvs. opposite, imbricate on twigs, linear or linear-lanceolate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, mostly acute: fls. red, scattered or in loose spikes; staminal bundles  $\frac{1}{2}$  in. long, with 15-20 filaments at or near end. (Named after Chas. Wilson, who had observed the plant.)

3. *M. hypericifolia*, Sm. Tall glabrous shrub: lvs. mostly opposite, lanceolate or oblong,  $\frac{3}{4}$ -1 $\frac{3}{4}$  in. long, obtuse or mucronate, the midrib prominent beneath: fls. rich red, in dense spikes about 2 in. long, the axis continuing as a leafy shoot; staminal bundles  $\frac{3}{4}$ -1 in. long, with 15-20 filaments at end: caps. sessile by broad base, to  $\frac{1}{4}$  in. diam.

4. *M. styphelioides*, Sm. Tall tree, sometimes to 80 ft., with thick spongy bark: lvs. ovate, sessile by a broad base,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, about  $\frac{1}{4}$  in. wide, tapering to sharp rigid tip, often somewhat twisted: fls. creamy-white, in dense spikes 1-2



in. long, the axis growing out before flowering is over; staminal bundles about  $\frac{1}{4}$  in. long, with several filaments near end: caps. globose. (Styphelioides: like *Styphelia*, a genus of the Epacridaceæ.)

5. *M. nesophila*, F. Muell. Glabrous shrub or small tree, with thick spongy bark: lvs. obovate-oblong,  $\frac{1}{2}$ –1 in. long, about  $\frac{1}{4}$  in. wide, obtuse or sometimes mucronate, tapering at base, obscurely 3-nerved: fls. pink or rose, in dense terminal heads, the axis seldom growing out until after flowering; staminal bundles about  $\frac{1}{2}$  in. long, with 10–15 filaments at end: caps. collected in globose mass. (*Nesophila*: from Greek for *island-loving*.)

6. *M. linariifolia*, Sm. Tall shrub or tree, young parts only pubescent: lvs. opposite, linear, 1–1 $\frac{1}{4}$  in. long,  $\frac{1}{8}$  in. wide, rigid, acuminate: fls. white, in pairs in terminal spikes 1–1 $\frac{1}{2}$  in. long, but the axis soon growing out; staminal bundles  $\frac{1}{2}$  in. or more long, bearing short filaments along the long claws: caps. sessile, narrow at base.—Sometimes planted as *M. Leucadendron*, which has lvs.  $\frac{1}{2}$ – $\frac{3}{4}$  in. broad.

7. *M. armillaris*, Sm. Tall glabrous shrub or small tree of graceful habit: lvs. crowded, narrowly linear,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long,  $\frac{1}{16}$  in. or less wide, acute and often curved at tip: fls. white, in cylindrical spikes 2 in. or more long, the axis continued in a leafy shoot; staminal bundles about  $\frac{1}{4}$  in. long, with numerous filaments near upper end of claw: caps. with broad base partly embedded in st.

8. *M. Huegelii*, Endl. Erect rigid shrub to 12 ft. high: lvs. spirally arranged and overlapping, ovate or ovate-lanceolate,  $\frac{1}{4}$  in. or less long, sessile, acute, striate with 3–7 nerves: fls. white, in dense slender cylindrical spikes 1–5 in. long, the axis continued in a leafy shoot; staminal bundles about  $\frac{1}{2}$  in. long, with 7–11 filaments at end: caps. globose, the broad base partly embedded in st. (Named for Carl von Huegel, born 1796, Australian naturalist.)

9. *M. decussata*, R. Br. Glabrous spreading shrub to 20 ft. high, the branches usually pendulous: lvs. opposite, lanceolate to oblong,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long,  $\frac{1}{16}$ – $\frac{1}{8}$  in. wide, narrowed at base, obtuse or acute: fls. lilac, in cylindrical spikes 1 in. or less long, the axis continuing as a leafy shoot, or the sterile fls. in globose lateral or terminal heads; staminal bundles about  $\frac{1}{4}$  in. long, with 10–15 filaments: caps. broad at base, partly embedded in st.

10. *M. ericifolia*, Sm. Large shrub or small tree: lvs. narrowly linear or nearly cylindric,  $\frac{1}{2}$  in. or less long, obtuse, often recurved from the middle: fls. yellowish-white, in cylindrical spikes  $\frac{1}{2}$ –1 in. long, the axis soon growing out into a leafy shoot, or the sterile fls. in nearly globular terminal heads; staminal bundles  $\frac{1}{4}$  in. long, with 7 filaments at end: caps. with broad base partially embedded in st.

11. *M. parviflora*, Lindl. (*M. Preissiana*, Schau). Tall shrub or tree: lvs. lanceolate or oblong-linear,  $\frac{1}{2}$  in. or less long, sharp-pointed, thick and rigid: fls. white or yellowish, in loose cylindrical spikes 1–2 in. long, the axis continuing as a leafy shoot; staminal bundles  $\frac{1}{4}$  in. long, with 10–12 filaments on upper part: caps. narrowed to base.

## 125. MELASTOMACEÆ. MELASTOMA FAMILY

Herbs, shrubs or trees, of about 175 genera and 3,000 species mostly of trop. distribution, but the genus *Rhexia* native in E. U. S.; several genera may be grown in greenhouses.—Lvs. opposite or rarely whorled, usually petioled, entire, serrulate or crenulate, commonly characteristically palmately 3–9-nerved, exstipulate: fls. bisexual, regular, often showy, the infl. various; calyx-tube free or adnate to ovary, usually 4–5-lobed; petals as many as calyx-lobes, inserted on mouth of calyx-tube, free or rarely slightly united; stamens as many or twice as many as petals and inserted with them, often inclined or declined, equal or alternate ones sometimes shorter, the anthers with very peculiar and diverse connective; ovary mostly inferior, 2- to several-celled with many ovules in each cell, with 1 style and stigma: fr. a berry or an irregularly or loculicidally dehiscent caps., usually inclosed in the calyx-tube.

A. Stamens very unequal (at least in ours).

B. Petals and calyx-lobes 5; stamens 10..... 1. TIBOUCHINA

BB. Petals and calyx-lobes 4; stamens 8.

C. Branches (in the following species) 4-winged..... 2. CENTRADENIA

CC. Branches not winged.

D. Fls. panicled..... 3. HETEROCENTRON

DD. Fls. solitary..... 4. SCHIZOCENTRON

- AA. Stamens equal or nearly so.  
 B. Number of stamens usually 3..... 5. SONERILA  
 BB. Number of stamens 8-10 or more.  
 C. Calyx-tube angled or winged..... 6. BERTOLONIA  
 CC. Calyx-tube not angled or winged.  
 D. Anthers corrugated..... 7. PHYLLAGATHIS  
 DD. Anthers not corrugated.  
 E. Connective of anthers appendaged or spurred on posterior side..... 8. MEDINILLA  
 EE. Connective not or only slightly spurred on anterior side.  
 F. Calyx-lobes with conspicuous appendages..... 9. TOCOCA  
 FF. Calyx-lobes not appendaged..... 10. MICONIA

1. **TIBOUCHINA**, Aubl. (*Pleroma*, D. Don). Mostly hispid shrubs or subshrubs, rarely herbs, one grown in greenhouses and also out-of-doors far S.; about 215 species in trop. Amer., particularly Brazil.—Lvs. usually large and leathery, ovate or oblong, petioled, 3-7-nerved, entire; fls. large and showy, in terminal branched panicles or solitary; calyx hirsute or strigose, 5-lobed; petals 5, obovate, entire or retuse; stamens 10, equal or unequal, the connectives with 2 tubercles or lobes at base, often unappendaged; ovary 5-celled, free or adnate to ribs of calyx, hispid at apex: fr. a 5-valved caps. inclosed by the persistent calyx-tube. (Tibouchi-na: native name in Guiana.)

**T. semidecandra**, Cogn. (*Pleroma macranthum*, Hook. *P. splendens*, Hort.). Pubescent shrub to 4 ft. and more high: lvs. ovate or oblong-ovate, 2-4 in. long, acuminate, densely villous on both sides, pale beneath: fls. violet to reddish-purple, 3-5 in. across, solitary or 3 together at ends of branchlets, subtended by 2 orbicular bracts; stamens purple, very unequal, the longest filaments glandular-pubescent. Brazil.

2. **CENTRADENIA**, Don. Perhaps 6 species of herbs and subshrubs native in Mex. and Cent. Amer., one sometimes grown in hothouses.—Branches 4-angled or 4-winged: lvs. lanceolate, those of each pair very unequal or one sometimes wanting: fls. rose, in cymes or corymbs; calyx-tube slightly 4-angled, the 4 lobes shorter than the tube; petals 4, rounded; stamens 8, unequal, connective produced at base, curved, with a club-shaped or 2-lobed appendage; ovary 4-celled, free above, glabrous and toothed at top: fr. a 4-valved caps. as long as the calyx-tube. (Centrade-nia: Greek for *spur* and *gland*, referring to the anthers.)

**C. grandifolia**, Endl. To 2 ft. and more high, the branches 4-winged: lvs. ovate-lanceolate to lanceolate, 2-6 in. long, acuminate and usually curving at end, bright red beneath: fls. rose-pink, in many-fld. cymes shorter than the lvs., the stamens very unequal. Mex.

3. **HETEROCENTRON**, Hook. & Arn. Erect herbs or subshrubs native in the mts. of Mex. and Cent. Amer.; about 7 species, one sometimes grown under glass or in the open far S.—Lvs. lanceolate, pinnately-nerved, entire, membranaceous: fls. white, rose, or purple, in panicles; calyx-tube setose, the 4 triangular lobes about same length as tube; petals 4; stamens 8, very unequal, the connectives of the longer stamens produced at base, erect or curved, the club-shaped appendages 2-parted; ovary 4-celled, 8-ribbed, nearly free: fr. a 4-valved caps. about equaling calyx-tube. (Heterocent-ron: Greek *unlike spurs*, referring to the anthers.)

**H. roseum**, A. Br. & Bouché (*Heeria rosea*, Triana). To 2 ft. or more high, the branches 4-angled: lvs. elliptic, about 1 in. long, setose: fls. bright rose (white in var. *alba*, Hook.), in terminal panicles, the pedicels pubescent. Mex.—Often cult. under the name *H. mexicanum*, but this species differs in its glandular calyx-tube, and the calyx-lobes are ciliate on margins.

4. **SCHIZOCENTRON**, Meissn. One creeping vine-like plant from Mex., sometimes grown in baskets and pots in the greenhouse.—Often united with *Heterocentron* but differing in its small lvs. 3-nerved from the base, the solitary

long-pedicelled fls. and the persistent calyx-lobes. (Schizocentron: Greek *split spur*, referring to the anthers.)

*S. elegans*, Meissn. (*Heeria elegans*, Schlecht. *Heterocentron elegans*, Kuntze). Lvs. ovate,  $\frac{1}{2}$  in. or less long, distinctly petioled, slightly pubescent: fls. purple, nearly 1 in. across; calyx-tube covered with glandular bristles, the lobes ciliate.

5. **SONERILA**, Roxb. (*Cassebeeria*, Dennst.). About 75 species of herbs or small shrubs native in India, Malay Archipelago, and S. China, a few occasionally grown in hothouses.—Lvs. membranaceous, often dimorphous, entire or serrulate, 3–5-nerved: fls. in racemes or spikes; calyx-lobes 3, short; petals 3; stamens 3, of equal length and alternating with petals, or very rarely 6 and of unequal length, connective not produced at base, sometimes 2-tubercled, unappendaged; ovary 3-celled, nearly or quite adnate to calyx-tube, hollowed out at top: fr. a 3-valved caps. (Soneri-la: native Indian name.)

*S. margaritacea*, Lindl. Sts. red, rather weak: lvs. glabrous, ovate-lanceolate, 7–9-nerved with regular rows of pearly spots between the nerves and parallel with them, purplish below, acutely serrate: fls. rose-colored. Java.

6. **BERTOLONIA**, Raddi. Herbs, often creeping, grown in greenhouses for the attractive foliage; 9 species from Brazil.—Sts. simple or often scapose: lvs. petiolate, entire or serrate, 3–9-nerved: fls. white, rose or purple, in scorpioid racemes; calyx-tube 3–9-angled or -winged, with 5 short entire or fringed lobes; petals 5; stamens 10, equal, connective not produced at base, unappendaged, shortly spurred at back; ovary 3-celled, usually partially adnate to calyx-tube, deeply hollowed out at top: fr. a 3-valved caps. inclosed by the 3-angled or -winged calyx-tube. (Bertolonia: after Antonio Bertoloni, Italian botanist in early 19th century.)

Veins lined on both sides with colored bands ..... 1. *B. maculata*  
Veins not lined on both sides with colored band ..... 2. *B. marmorata*

1. *B. maculata*, DC. St. densely clothed with rusty hairs: lvs. hispid, broadly ovate, cordate at base, obtuse, long-petioled, dark velvety-green above, often spotted, the veins lined on both sides with magenta or purple band: fls. rose; calyx densely clothed with glandular hairs.

2. *B. marmorata*, Naud. St. less hairy than in *B. maculata*: lvs. ovate-oblong, streaked with white along veins, sparsely hairy: fls. purple; calyx sparsely hairy, not glandular.

7. **PHYLLAGATHIS**, Blume. About 13 species have been described from the Malay Archipelago and China; woody plants grown in the greenhouse. — Sts. short and thick, the branches herbaceous: lvs. large, petioled, entire or denticulate, 7–9-nerved: fls. rose, crowded into a short-peduncled head sometimes with large involucreal bracts; calyx-lobes and petals 4, rarely 3; stamens 8, equal, anthers corrugated, connective not produced at base, unappendaged or slightly spurred at back; ovary 4-, rarely 3-celled, adnate to base of calyx-tube, deeply hollowed out at top, the margins angled: fr. a 4-valved caps. (Phyllagathis: from Greek, probably referring to the involucre heads.)

*P. rotundifolia*, Blume. St. 4-sided, dark purple, 1–2 ft. tall: lvs. roundish-ovate, 6 in. or more long, denticulate, abruptly acuminate, glossy green and plaited above, tinted with metallic blue and purple, red beneath with prominent veins: fls. about  $\frac{1}{2}$  in. across, inclosed in an involucre of 5 or 6 dark purple bracts. Sumatra.

8. **MEDINILLA**, Gaud. Erect or climbing branching shrubs of 125 or more species native in trop. E. Asia, Pacific Isls., W. Afr., and Mascarene Isls.; furnishing a few attractive hothouse subjects.—Lvs. fleshy, opposite or verticillate, rarely solitary and alternate or the lvs. in each pair very unequal, 3–9-nerved or sometimes pinnate-veined: fls. white or rose, in lateral few- or many-fl'd. panicles or cymes, often with showy bracts; calyx-lobes usually

4-5, rarely irregularly cleft; petals 4-5, rarely 6; stamens 8 or 10, seldom 12, equal or nearly so, rarely strongly unequal, connective usually not produced at base, 2-lobed or -spurred in front, 1-2-lobed or 1-spurred at back; ovary 4-6-celled, adnate to calyx completely or by septa: fr. a berry crowned by the calyx-lobes. (Medinilla: named after José de Medinilla of Pineda, Governor of the Ladrões.)

Panicles pendulous; bracts large and showy.....1. *M. magnifica*  
 Panicles erect; bracts none.....2. *M. Teysmanni*

1. *M. magnifica*, Lindl. Evergreen shrub with 4-angled or -winged branches, having a dense ring of short fleshy processes at the joints between the lvs.: lvs. opposite, sessile, ovate or ovate-oblong, up to 1 ft. long: fls. coral-red, about 1 in. across, in pendulous pyramidal panicles sometimes 1 ft. long, having showy pinkish bracts 1-4 in. long; petals 5; anthers purple, the filaments yellow. Philippines.

2. *M. Teysmanni*, Miq. (*M. amabilis*, Dyer). Sts. 4-winged: lvs. opposite, sessile, obovate- or elliptic-oblong, to 1 ft. long: fls. rose-colored,  $1\frac{1}{2}$ -2 in. diam., in an erect pyramidal panicle, without bracts; petals 5; stamens 10, with pale violet anthers. (Named after J. E. Teysmann, Dutch gardener, who wrote in 1838.) Celebes, New Guinea.

9. **TOCOCA**, Aubl. About 50 shrubby species native in trop. S. Amer., one sometimes grown as a foliage plant in hothouses.—Lvs. large, petioled, entire or denticulate, 5-nerved, usually membranaceous, the petiole or blade often inflated at base into a 2-lobed bladder: fls. showy, white or rose, in mostly terminal panicles; calyx-lobes 5-6, appendaged with short or long teeth; petals 5-6; stamens 10 or 12, equal, connective not produced at base, usually tuberculate or shortly spurred at back above the base; ovary 3-5-celled, base immersed in calyx-tube, otherwise free or more or less adnate, with bristly apex: fr. a fleshy berry. (Toco-ca: native name of one of the species in Guiana.)

*T. platyphylla*, Benth. (*Sphærogyne latifolia*, Naud.). St. short, simple, branches herbaceous, with long bristles especially at nodes: lvs. broadly ovate, up to 1 ft. or more long, apiculate, entire or minutely denticulate-ciliate, without bladders at base: fls. rose or red. Colombia, Venezuela, Costa Rica.

10. **MICONIA**, Ruiz & Pav. Nearly 600 species of trop. American polymorphous shrubs or trees, a few grown in the hothouse for the handsome foliage.—Lvs. usually petioled, entire or serrate: fls. rather small, the infl. various, white, rose, purple, or yellow; calyx-lobes 4-8, short; petals 4-8, spreading or reflexed; stamens 8-16 or rarely more, equal or sometimes slightly unequal, anthers polymorphous, connective shortly or not produced at base, appendaged laterally or in front, seldom slightly spurred at back; ovary 2-5-celled, rarely free: fr. a dry or leathery berry. (Miconia: after D. Micon, Spanish physician.)

*M. magnifica*, Triana (*Cyanophyllum magnificum*, Hort. *Tamonea magnifica*, Voss). Robust shrub to several ft. high in cult.: lvs. broad-ovate, 2-2½ ft. long, wavy at margins, arched and rugose, lustrous green above, reddish-bronze below, the prominent veins white or light green: fls. small, in panicles. Mex.

## 126. ONAGRACEÆ. EVENING-PRIMROSE FAMILY

A marked family consisting chiefly of herbaceous annuals or perennials (a few shrubs), many of them popular and cult. for ornament, usually in the open, a few yielding products of commercial value; about 36 genera and 470 species, mostly natives of the temp. parts of the New World (W. U. S. and Mex.) but also abundant in S. Amer.—Lvs. alternate or opposite: fls. bisexual, regular or sometimes irregular, perigynous or epigynous, axillary, spicate or racemose; calyx-tube adnate to the ovary and often produced beyond it, the limb 2-6-lobed (usually 4-lobed); petals 4, rarely more or



fewer, mostly clawed, convolute in the bud; stamens as many or twice as many as the petals, inserted with them on the summit of the calyx-tube or on a disk; ovary 2-4-celled, with numerous ovules; style 1; stignas 1-4: fr. a caps., rarely a berry or nut. Recognizable by the numerical plan (2-4) of the fls. and the inferior ovary with numerous ovules.

- A. Ovary 2-6-celled, the cells many-ovuled: fr. a caps. (in *Fuchsia* a berry).
- B. Stamens 3-12.
  - c. Seeds furnished with a tuft of silky hairs.
    - D. Corolla bright scarlet; calyx with long-funnelform tube..... 1. ZAUSCHNERIA
    - DD. Corolla rose-colored, white, or sometimes yellow; calyx not as above..... 2. EPILOBIUM
  - CC. Seeds without a tuft of hairs.
    - D. Calyx little or not at all produced beyond the ovary.
      - E. Stamens 3-6; ovary 3-6-celled: caps. septicidal..... 3. LUDWIGIA
      - EE. Stamens 8-12; ovary 4-celled.
        - F. Caps. septicidal: petals sessile..... 4. JUSSIÆA
        - FF. Caps. loculicidal: petals clawed..... 5. CLARKIA
    - DD. Calyx long-produced beyond the ovary (except sometimes in *Cenothera*); ovary 4-celled.
      - E. Petals mostly sessile (sometimes 0); stamens usually 8.
        - F. Fr. a caps.
          - G. Fls. commonly yellow or white..... 6. CENOTHERA
          - GG. Fls. never yellow, mostly purple or rose..... 7. GODETIA
        - FF. Fr. a pulpy berry: fls. not yellow..... 8. FUCHSIA
        - EE. Petals distinctly clawed; stamens 4..... 9. EUCHARIDIUM
  - BB. Stamens 1-2..... 10. LOPEZIA
- AA. Ovary 1-4-celled, the cells mostly 1-ovuled: fr. nut-like.
  - B. Plants terrestrial: lvs. alternate: stamens 6-8..... 11. GAURA
  - BB. Plants aquatic: submersed lvs. opposite: stamens 4..... 12. TRAPA

1. **ZAUSCHNERIA**, Presl. Low perennials, with large brilliant scarlet fuchsia-like fls., sometimes grown in flower-gardens; a genus accredited by some authorities with but a single species, by others with about 7. -Shrubby at base: lvs. alternate or the lowest opposite: fls. racemose; calyx scarlet, the tube globose at base, funnelform above, bearing 8 small scales within, the limb 4-lobed; petals scarlet, inserted on the throat of the calyx, alternate with and little if any longer than its lobes; stamens 8, exserted: caps. slender-fusiform, obtusely 4-angled, 4-valved, many-seeded. (*Zauschneria*: named for a professor of natural history at Prague.)

**Z. californica**, Presl. CALIFORNIA-FUCHSIA. About 1 ft. high, the sts. branched, decumbent or nearly erect: herbage tomentose and often somewhat villous: lvs. lanceolate to oblong or oblong-ovate, entire or remotely serrate, acute or obtuse,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long: fls. 1-2 in. long, in autumn. Calif.—A var. has less hairy foliage and markedly feather-veined lvs.

2. **EPILOBIUM**, L. WILLOW-HERB. Probably 200 species of wide distribution, mostly in temp. parts of the world, a few used as border-plants along the water's edge or in moist places.—Herbs or subshrubs, sometimes annual, erect, sprawling, or creeping: lvs. willow-like, opposite or alternate, toothed or entire: fls. solitary and axillary or in terminal spikes or racemes, rose-purple to white or flesh-colored, very rarely yellow; calyx-tube little if at all produced beyond the ovary; petals 4, obovate or obcordate, erect or spreading; stamens 8, unequal; ovary 4-celled; stigma 4-lobed: caps. long and narrow, terete or 4-sided, 4-valved; seeds many, provided with a tuft of silky hairs. (*Epilobium*: Greek *upon the pod*, referring to the structure of the fl.)—The first species is sometimes separated in the genus *Chamænerion*.

- Lvs. alternate, short-petioled: fls. in leafless terminal racemes..... 1. *E. angustifolium*
- Lvs. usually opposite, sessile: fls. axillary or in short racemes leafy at base..... 2. *E. hirsutum*

1. **E. angustifolium**, L. GREAT WILLOW-HERB. FIREWEED. St. erect, in cult. mostly branched and 3-5 ft. high, in the wild simple or branched, 2-8 ft. high: lvs. alternate, very short-petioled, lanceolate, acute, entire or minutely toothed,  $\frac{2}{3}$ -6 in. long: fls. large, in long terminal spike-like racemes; calyx with very short

tube and long narrow lobes; petals purple, rounded at apex, about  $\frac{1}{2}$  in. long, widely spreading; stigma 4-lobed: caps. terete, 2-3 in. long. Summer. Eu., Asia, N. Amer., abundant on newly burned-over areas.—There is a var. with pure white fls.

2. *E. hirsutum*, L. St. stout and branched, 2-4 ft. high, the whole plant soft-hairy: lvs. usually opposite, lanceolate, serrate, clasping at base, 1-3 in. long: fls. purple, erect, about 1 in. across, axillary or in short racemes leafy at base; petals spreading, deeply notched at apex: caps. quadrangular, very long and hairy. Summer. Eu.; naturalized in E. U. S.

3. *LUDWIGIA*, L. (Sometimes spelled *Ludvigia*.) Mostly perennial aquatic or semi-aquatic plants, one widely distributed amongst growers of aquarium subjects and prized for its graceful habit and evergreen foliage; species about 20-25 widely spread in warm and temp. regions, mostly in N. Amer.—Small herbs often creeping, sometimes floating: lvs. opposite or alternate: fls. solitary and axillary or clustered in terminal spikes or heads, often inconspicuous, 3-6-parted, the stamens as many as the calyx-segms.; corolla small or lacking: caps. short, opening longitudinally or through pores at the apex. (Ludwig-ia: C. G. Ludwig, 1709-1773, botanist and botanical author at Leipzig.)

*L. Mulertii*, Mulertt. Aquatic herb with weak sts. rooting at the nodes: lvs. opposite, oval to lance-oblong, entire, narrowed to petioles about as long as the blade or shorter, glossy dark green above and crimson-purple beneath when growing above water in the sun: fls. yellow, axillary: caps. oblong, truncate,  $\frac{3}{4}$  in. long, crowned by the persistent calyx-lobes; seeds without pappus, retaining life six to eight years if left within the caps. (Introduced by Hugo Mulertt, of Cincinnati.) S. Amer.

4. *JUSSIEA*, L. (Also written *Jussieu*.) PRIMROSE-WILLOW. A genus of aquatic or shore-plants including one or two herbs which are more or less cult.; about 50 species widely distributed in temp. and warm regions, but most abundant in S. Amer., some native in the U. S.—Herbs, rarely shrubs or even tree-like: lvs. alternate, usually entire: fls. yellow or white, solitary, axillary; pedicels long or short, often 2-bracteate near the apex; tube of calyx not prolonged beyond the ovary, the 4-6 lobes acute and persistent; petals 4-6, spreading, sessile on the margin of an epigynous disk; stamens twice as many as petals and inserted with them; ovary 4-5-celled; stigma 4-6-lobed: caps. terete or angled or ribbed, 4-6-celled, dehiscent, usually many-seeded. (Jussieu-a: Bernard de Jussieu, 1699-1777, who laid the foundations of a modern natural system of the vegetable community.)

*J. longifolia*, DC. Erect glabrous plant grown as an annual, the st. 3-angled: lvs. sessile, lanceolate-linear, acuminate at both ends, minutely glandular beneath at the margins: pedicels 1-fl., solitary in the axils, longer than the ovary, 2-bracteolate at apex; petals 4, yellow, obovate, emarginate; stamens 8. Brazil.

5. *CLARKIA*, Pursh. Showy-fl. annuals, a few used for low masses and for edgings in flower-gardens, also for vases and baskets; a half-dozen or more species in W. N. Amer.; they have been much improved by domestication.—Virgately branching herbs, glabrous or pilose: lvs. alternate, linear or lanceolate to ovate, entire or denticulate: fls. rose or purple, medium-sized, solitary in the axils or in terminal racemes; calyx-tube little prolonged beyond the ovary; petals 4, clawed, the limb dilated, entire or 3-lobed; stamens 8, inserted on the throat of the calyx, the alternate ones short or rudimentary; ovary 4-celled; style filiform; stigma 4-lobed: caps. linear, straight or curved, somewhat 4-angled, 4-valved; seeds numerous. (Clark-ia: Capt. Wm. Clark, 1770-1838, companion of Lewis, explorer of the Rocky Mt. region and further west.)

Claw of petals not toothed: lvs. ovate to ovate-lanceolate, remotely toothed.....1. *C. elegans*  
Claw of petals toothed: lvs. linear to linear-lanceolate, entire.....2. *C. pulchella*

1. *C. elegans*, Dougl. (*C. nerifolia*, Hort.). Erect, 1-4 ft. high, glabrous except the frs. and calyces, the reddish glaucous sts. simple or sparingly branched: lvs. ovate to ovate-lanceolate, remotely dentate: fls. purple or rose-colored, running into white vars., double forms in cult.; petals about  $\frac{3}{4}$  in. long, often spreading laterally in pairs, the limb and claw of about equal length, the claw not toothed; anthers of long stamens bright crimson, of short stamens whitish: caps. about 1 in. long, sessile or nearly so, often long-hairy. Summer. Calif.

2. *C. pulchella*, Pursh. Twelve to 18 in. high, branching, often tufted and dwarf, the sts. mostly puberulent: lvs. linear to linear-lanceolate, narrowed to a petiole, entire: fls. lilac running into white vars.; petals in wild plants  $\frac{3}{4}$  in. long, the blade with 3 wide-spreading lobes, the claw with a pair of recurved teeth: caps. stalked, short-pubescent.—There are semi-double and dwarf forms and one with entire petals. Some of the garden clarkias are apparently hybrids between *C. elegans* and *C. pulchella*.

6. **ÆNOTHERA**, L. EVENING-PRIMROSE. A polymorphic genus concerning whose generic bounds there is much difference of opinion, regarded as one genus by some authorities and broken up into 10 or a dozen by others; the entire assemblage comprises perhaps 90-100 species, and is here treated as a single genus, since it is fairly homogeneous from the hort. point of view, and the names already in the trade are well established; the *œnotheras* are of wide distribution in N. Amer., occurring more rarely in the tropics.—Annual, biennial, and perennial herbs, or sometimes shrubby at base: lvs. alternate, sessile or petiolate, entire, toothed, lobed, or parted: fls. mostly showy, yellow, white, or rose-color, axillary and solitary or rarely in 2's or clusters; calyx-tube 4-sided, produced beyond the ovary, the 4 usually strongly reflexed lobes commonly deciduous; petals 4, obovate or obcordate, sessile or nearly so; stamens 8, equal or alternating long and short; ovary 4-celled; stigma entire or 4-lobed or -parted: caps. loculicidal, 4-valved. (*Ænothe-ra*: said to be Greek for *wine-scenting*, in allusion to an ancient use of the roots.)

- A. Stigma capitate or disk-like, entire. .... 1. *Æ. bistorta*
- AA. Stigma deeply 4-cleft or at least 4-toothed.
- B. Stamens of equal length.
- C. Seeds angled, horizontal in the pod.
- D. St. green: stigma surrounded by the anthers and pollinated in the bud. .... 2. *Æ. biennis*
- DD. St. red: stigma exserted beyond the stamens and pollinated after the buds open .... 3. *Æ. Lamarckiana*
- CC. Seeds not angled, ascending in the pod. .... 4. *Æ. Drummondii*
- BB. Stamens of unequal length.
- C. Species caulescent (with st.).
- D. Fls. yellow.
- E. Seeds crested. .... 5. *Æ. missouriensis*
- EE. Seeds not crested.
- F. Plant more or less glaucous, glabrous. .... 6. *Æ. glauca*
- FF. Plant not glaucous, usually hairy or pubescent.
- G. Caps. glabrous or bearing gland-tipped hairs.
- H. Diam. of fls.  $1\frac{1}{2}$ -2 in. .... 7. *Æ. fruticosa*
- HH. Diam. of fls. 1 in. or less. .... 8. *Æ. pumila*
- GG. Caps. grayish-pubescent, the hairs glandless.
- I. Lvs. linear to narrow-lanceolate. .... 9. *Æ. linearis*
- HH. Lvs. oblong-lanceolate to elliptic-lanceolate. .... 10. *Æ. pratensis*
- DD. Fls. white, pink or reddish.
- E. Plant canescent or villous, usually erect or at least ascending.
- F. Calyx-tube as long as ovary. .... 11. *Æ. speciosa*
- FF. Calyx-tube shorter than ovary.
- G. Color of fls. white, becoming rose. .... 12. *Æ. tetraptera*
- GG. Color of fls. purple or rose. .... 13. *Æ. rosea*
- EE. Plant glabrous or essentially so, nearly stemless or else prostrate. .... 14. *Æ. acaulis*
- CC. Species stemless or essentially so. .... 15. *Æ. cæspitosa*

1. *Æ. bistorta*, Nutt. (*Sphærostigma bistorta*, Walp.). Annual, 1-2 ft. high, decumbent at base, hairy: radical lvs. spatulate to lanceolate, petiolate, dentate; st.-lvs. mostly sessile, ovate to narrow-lanceolate, dentate, about 1 in. long: fls. yellow, turning green; calyx hirsute, the tube 1-3 in. long; petals about  $\frac{1}{2}$  in. long, usually with a brown spot at base; ovary 4-celled; stigma capitate: caps. sessile, linear, 4-angled, contorted,  $\frac{3}{4}$  in. or less long; seeds in 1 row in each cell. S. Calif.—

Var. *Veitchiana*, Hook. (*Sphærostigma Veitchianum*, Small). More slender: radical lvs. narrow-ob lanceolate, long-petioled: caps. narrower, 1-1½ in. long, little contorted. S. Calif.

2. *Æ. biennis*, L. (*Onagra biennis*, Scop.). EUROPEAN EVENING-PRIMROSE. Usually biennial, but often flowering the first year, rosettes attaining 2 ft. diam.: roots large, fleshy, often 2 in. diam. at the crown: st. about 3-4 ft. high, copiously branched, green: lower lvs. narrowly oblanceolate, the upper ovate: fls. yellow, opening at evening; calyx-tube nearly 1½ in. long, enlarging at the throat; petals obcordate, 1 in. wide and not as long; stigma 4-cleft, surrounded by the anthers and self-pollinated in the bud: caps. 4-angled, 1 in. long, loosely aggregated in the lower part of the spike, more densely above, shorter than the mostly persistent leafy bracts; seeds angled, horizontal in the pod.—Introduced into Eu. from Amer. and now a common weed in the Old World. A number of obscure kinds pass in Amer. under the name *Æ. biennis*, most of them being more weedy than the European species and the roots generally woody and tough. Var. *grandiflora*, Lindl. (*Æ. grandiflora*, Ait.). Plant large and strong: lower lvs. often pinnatifid: fls. much larger, the petals 1-2½ in. long: buds glabrous, usually red-spotted.

3. *Æ. Lamarckiana*, Ser. Differs from *Æ. biennis* in its densely red-tuberculate sts., broad crinkled lvs. and much larger fls.: stigmas longer than the stamens and pollinated by insects after the buds open: buds densely pilose and viscid. (Named for J. B. Lamarck, 1744-1829, distinguished French naturalist, author of the Lamarckian philosophy of organic evolution.) Unknown in the wild state and considered by some as of hort. origin, by others as being a wild species yet undiscovered in its native region.—*Æ. rubricalyx*, Gates, AFTERGLOW, has calyx-tube and -segs. fine rich red.

4. *Æ. Drummondii*, Hook. (*Raimannia Drummondii*, Rose). Perhaps biennial but grown as an annual, 1-2 ft. high, from an oblique or decumbent base, densely soft-pubescent: lvs. lance-oblong or oblanceolate, acute or obtuse, tapering gradually or abruptly to a short petiole, entire or slightly toothed: fls. 2-3 in. across, nocturnal, bright yellow, showy; calyx-tube usually 2 in. long and very narrow; stigma deeply 4-cleft: caps. narrow-cylindric, obtusely 4-angled, 1-2 in. long, with numerous seeds in 2 rows in each cell. (James L. Drummond, page 431.) Tex. coast.

5. *Æ. missouriensis*, Sims (*Æ. macrocarpa*, Pursh. *Megapterium missouriensis*, Spach). Low usually pubescent perennial with a hard base, the sts. ascending to about 1 ft.: lvs. thick, soft-pubescent, narrowly oval to lanceolate, 5 in. or less long, acuminate, narrowed to a petiole, entire or remotely denticulate: fls. yellow, showy; calyx-tube very long and slender, enlarging at the top; petals 1-2½ in. long, very broad; stamens of unequal length; stigma 4-cleft: caps. 2-3 in. long and nearly as wide, broadly 4-winged; seeds crested. Mo. and Neb., west and south.

6. *Æ. glauca*, Michx. (*Kneiffia glauca*, Spach). Erect glabrous more or less glaucous perennial to 3 ft. high: lvs. ovate to ovate-oblong, 4 in. or less long, acute or somewhat obtuse, remotely denticulate, sessile or the lower petioled: fls. large, yellow, diurnal, in short leafy clusters; calyx-tube about ¾ in. long, very slender, somewhat dilated at top; petals obovate, more or less emarginate, 1 in. long; stamens unequal; stigma deeply 4-lobed: caps. oblong, rather small, broadly 4-winged, short-stalked. Va., Ky., and south.—Var. *Fraseri*, Torr. & Gray (*Æ. Fraseri*, Pursh), is a form with ovate-lanceolate often slightly petioled lvs.

7. *Æ. fruticosa*, L. (*Kneiffia fruticosa*, Raim.). SUNDROPS. Rather stout perennial or sometimes biennial, erect or more or less branched, the terete sts. usually reddish and somewhat villous: lvs. ovate to narrow-lanceolate, 3 in. or less long, usually acute, repand-denticulate or entire, sessile or short-petioled: fls. yellow, diurnal, showy, 1½-2 in. across, in an elongating cluster, with leafy bracts; calyx-tube mostly longer than the ovary; stamens unequal; stigma deeply 4-lobed: caps. oblong to obovate, short-stalked or sessile, strongly winged, glabrous or with gland-tipped hairs. N. S., south and west.—Very variable. Var. *Youngii*, Bailey (*Æ. Youngii*, Hort.), is common in cult. and is prized for its stocky growth and profusion of bloom. It is a strong larger-leaved plant 2 ft. high, much-branched and somewhat decumbent at base, with firm, shiny, slightly glaucous foliage and many bright lemon-yellow fls.

8. *Æ. pumila*, L. (*Kneiffia pumila*, Spach). SUNDROPS. Slender erect biennial or perennial; st. 1-2 ft. high, simple or branched, finely puberulent: lvs. entire, oblanceolate or oblong, obtuse or obtusish, narrowed at base and often petioled, usually glabrous, the radical spatulate: fls. yellow, diurnal, ½-1 in. across, in loose terminal leafy-bracted spikes or racemes; calyx-tube shorter than the ovary; petals



obcordate; stamens unequal; stigma deeply 4-lobed: caps. mostly clavate, short-stalked or sessile,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, glabrous. Summer. Newf., south and west.—*O. Pilgrimii*, Hort., appears to belong with this species.

9. *O. linearis*, Michx. (*Kneiffia linearis*, Spach). SUNDROPS. Slender biennial or perennial, 12–20 in. high, pilose, puberulent or nearly glabrous: basal lvs. spatulate to broad-oblongate; st.-lvs. linear to narrow-lanceolate, entire or slightly denticulate, acute or obtuse, short-petioled: fls. bright clear yellow,  $1\frac{1}{2}$  in. or more across, standing well above the foliage; calyx-tube  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, shorter than the segms.; petals obovate, notched or erose at apex; stamens unequal; stigma deeply 4-lobed: caps. clavate, grayish-pubescent with glandless hairs, with papery glabrous wings. Summer. Conn. south.

10. *O. pratensis*, Rob. (*Kneiffia pratensis*, Small). SUNDROPS. Perennial to 3 ft. high, forming a clump; sts. sometimes branched above, with soft spreading hairs: lvs. oblong-lanceolate to elliptic-lanceolate, hairy, entire or sinuate, acute or obtuse: fls. bright yellow, diurnal, leafy-bracted, mostly clustered at top of st.; calyx-tips hirsute; petals obcordate,  $\frac{1}{2}$ –1 in. long; stamens unequal; stigma deeply 4-lobed: caps. club-shaped, hispid, somewhat wing-angled, sessile or nearly so. Early summer to midsummer. Me. to Ia. and Ark.

11. *O. speciosa*, Nutt. (*Hartmannia speciosa*, Small). Canescent perennial 2 ft. or less high, with a rootstock; branches erect or ascending: lvs. linear to lance-oblong, narrowed at base, 4 in. or less long, remotely or sinuately dentate, or the lower ones pinnatifid: fls. white or rose, diurnal,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. broad, usually few, loosely spicate; calyx-tube funnelform, as long as or longer than the ovary; stamens unequal; stigma 4-lobed: caps.  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, 8-winged, acute at top, stalked. Late spring to midsummer. Mo., west and south; frequent in cult.

12. *O. tetraptera*, Cav. (*Hartmannia tetraptera*, Small). Villous plant, with white fls. changing to rose: calyx-tube shorter than the ovary: caps. larger and more broadly winged than in the foregoing, very abruptly contracted at top. Tex. and Ariz. south.—Var. *Childsii*, Bailey (*O. rosea* var. *mexicana*, Hort.). MEXICAN EVENING-PRIMROSE. A trailing plant in cult.: lvs. broader and less pointed than in the species: fls. in pink, white, blush, and other shades. Flower-garden or conservatory plant, introduced from Tex. by John Lewis Childs in 1892.

13. *O. rosea*, Ait. (*Hartmannia rosea*, Don). Biennial or perennial, with erect or ascending sts. to 2 ft. high, branching from base: herbage finely hairy: lvs. lanceolate to narrow ovate-lanceolate, mostly acuminate, rather abruptly narrowed to a petiole, acuminate or acute, entire or remotely denticulate or the larger ones small-lobed at base: fls. small, fuchsia-like, purple or rose; calyx-tube shorter than the ovary: caps. much like that of *O. speciosa*. Tex. and New Mex. south.

14. *O. acaulis*, Cav. (*O. taraxicifolia*, Hort.). Glabrous or puberulent tufted perennial or biennial, at first stemless, later producing prostrate somewhat zigzag sts.: lvs. oblong in outline, 5–8 in. long, petioled, deeply parted into many narrow remote segms., often with 1–2 narrow salient teeth between the segms.: fls. axillary, usually opening white, but changing to rose, 2–3 in. across, the very slender tube 3–5 in. long; stamens unequal; stigma 4-lobed: caps. stalked, short-obovate, about  $\frac{3}{4}$  in. long, the 4 broad triangular wings widest above the middle. Summer. Chile.

15. *O. cæspitosa*, Nutt. (*Pachylophus cæspitosus*, Spach). Perennial or biennial to 4 ft. high, stemless or essentially so: lvs. clustered, oblong to narrow-lanceolate or spatulate, sometimes 1 ft. long, attenuate, repand-toothed, pubescent: fls. white or pink,  $1\frac{1}{3}$ –3 in. across, the petals obcordate; calyx-tube very slender, enlarging upward, 2–6 in. long, longer than the ovary; stamens unequal; stigma 4-celled: caps. oblong, pointed, 1–2 in. long, with wrinkled or contorted wings. S. Dak., Neb., west and south.

7. **ODETIA**, Spach. Erect annuals suitable for the flower-garden; 20 or more species in western parts of S. and N. Amer., especially Calif.—Lvs. alternate, narrow, short-petioled or sessile: fls. showy, in leafy racemes or spikes, opening during the day; calyx often colored, the tube obconic or funnel-form, long-produced beyond the ovary; petals 4, commonly broad and entire, rose, lilac-purple, or white, often marked with a large deep crimson or purple spot; stamens 8, those opposite the petals shorter; ovary 4-celled, inferior: fr. a many-seeded 4-celled 4-valved caps. (Gode-tia: C. H. Godet, 1797–1879, Swiss botanist.)

Plants slender, branching, 1-2 ft. high: corolla 1-2 in. across.

Buds erect.....1. *G. amena*

Buds nodding.....2. *G. Botta*

Plants stout, simple, 4-12 in. high: corolla 3-5 in. across.....3. *G. grandiflora*

1. *G. amena*, Lilja. FAREWELL-TO-SPRING. Slender, branching, 1-2 ft. high: lvs. linear to lanceolate,  $\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, often with smaller ones fascicled in the axils: buds erect: calyx-lobes united and turned to one side on expansion of the fl.; corolla lilac-crimson or red-pink, satiny, 1-2 in. broad: caps. teretish, sessile or very shortly pedicelled. Early summer. Calif. to B. C.—There are white-fl. and double-fl. forms, also one with crimson petals bearing a large central blotch of deeper color.

2. *G. Botta*, Spach. Similar to the preceding: buds nodding: petals pink or light crimson; stigmas united at tips and forming a cup-like apex to the style: caps. long-stalked, usually with flat sides. (Named for M. P. E. Botta, traveler of the Natural History Museum of Paris, who first collected this species, 1829.) S. Calif. near the coast.

3. *G. grandiflora*, Lindl. (*Enothera Whitneyi*, Gray). Stout, simple, dwarfish, 4-12 in. high: lvs. oblong, tapering at both ends: buds 1-2 in. long: fls. in a short spike or cluster of spikelets; corolla 3-5 in. across, rose-red with a deeper blush or blotch in center, varying to pure white, dark crimson or bright carmine: caps. sessile, 4-sided, 8-ribbed. Calif.

8. **FUCHSIA**, L. Probably 70-80 species of shrubs or small trees, seldom climbing, mostly in trop. Amer. but 3 or 4 in New Zeal.; less than a half-dozen species have entered largely into garden forms.—Lvs. simple, opposite, alternate or whorled: fls. mostly showy, axillary or sometimes racemose or paniculate, usually pendulous, in shades of red and purplish and with some parts often white; calyx-tube bell-shaped to tubular, prolonged beyond the ovary, the limb with 4 spreading lobes; petals 4, sometimes 5, or in some species wanting; stamens 8, mostly unequal, often exserted; style long-exserted, the entire or 4-lobed stigma prominent: fr. a 4-celled soft berry. (Fu-chsia: Leonard Fuchs, 1501-1565, German professor of medicine, and botanical author.)

All fls. drooping.

Tube of calyx shorter than the lobes (or in *F. speciosa* sometimes as long again); petals retuse.

Color of petals greenish.....1. *F. splendens*

Color of petals purple, blue, red, or white.

Petals seldom  $\frac{1}{2}$  in. long: lvs. lanceolate to narrow-ovate.....2. *F. magellanica*

Petals  $\frac{1}{2}$ -1 in. long: lvs. broader.....3. *F. hybrida*

Tube of calyx three or more times as long as the lobes; petals pointed.....4. *F. triphylla*

All fls. erect.

Fls. in an erect terminal naked panicle.....5. *F. arborescens*

Fls. solitary and axillary.....6. *F. procumbens*

1. *F. splendens*, Zucc. Much-branched shrub: lvs. ovate-cordate, pale green, serrate: fls. solitary on slender axillary pedicels, 1 $\frac{1}{2}$  in. long, drooping, the calyx scarlet, tipped pale green, with swollen base and compressed tube; petals ovate, greenish, shorter than the calyx-lobes; stamens long-exserted, the anthers yellow. Mex.

2. *F. magellanica*, Lam. (*F. macrostemma*, Ruiz & Pav.). Plant glabrous or nearly so: lvs. opposite or in 3's, lance-ovate, very short-petioled, dentate, 1-2 in. long: calyx-tube oblong or short-cylindric, little longer than the ovary, the oblong-lanceolate lobes red; petals normally blue, shorter than the calyx-lobes, about  $\frac{1}{2}$  in. long; stamens long-exserted. Peru south to Tierra del Fuego.—*F. corallina*, Hort., *F. tenella*, Hort., and others may be classed here. There are apparently many hybrids. Var. *globosa*, Bailey (*F. globosa*, Lindl. *F. macrostemma* var. *globosa*, Nichols). Lvs. opposite, short-petioled, ovate, acute, lightly dentate: fls. red-purple, small and short, axillary on slender pedicels, the buds nearly globose and the tips of the sepals cohering even after the fl. begins to burst; calyx-tube very short; petals erect, half as long as the calyx-lobes. Peru, Mex. There is a form with variegated lvs. Var. *Riccartonii*, Bailey (*F. Riccartonii*, Hort.). Very like var. *globosa* and reported to be a seedling of it, 6-10 ft. high, making a trunk 3 in. diam. and becoming wide-spreading; shoots slender: fls. red. (Said to have been raised at Riccarton, near Edinburgh, Scotland, about 1830, but reported as originating in

the Falkland Isls.). Var. *gracilis*, Bailey (*F. gracilis*, Lindl. *F. macrostemma* var. *gracilis*, Nichols.). Very slender and graceful, twiggy and cross-branched: lvs. lanceolate to ovate, toothed, the petioles  $\frac{1}{2}$  in. long: fls. drooping, very long-pedicelled, solitary or in pairs; calyx scarlet, the slender tube nearly as long as the long, narrow, acute, spreading lobes; petals purple, retuse, shorter than the calyx-lobes. Chile.—A variegated var. is advertised. *F. Thompsonii*, Hort., is said to belong here. Var. *conica*, Bailey (*F. conica*, Lindl. *F. macrostemma* var. *conica*, Nichols.). Shrubby, very leafy: lvs. 3-4 together, toothed, ovate, the petiole one-third length of blade, pubescent: fls. small, axillary, solitary, on peduncles much longer than lvs.; calyx scarlet, the tube conical (widest at base) and equaling the lobes; petals dark purple, erect and emarginate. Raised from seeds brought from Chile. Said to differ from var. *gracilis* in having broader lvs., in being less floriferous, and in having a conical calyx-tube which widens above the ovary and then narrows.

3. *F. hybrida*, Voss (*F. speciosa*, Hort.). The common garden fuchsia of the present day, very variable in many of its characters, differing from *F. magellanica* in having stouter branches, longer and broader lvs. and larger fls.: plants shrubby, glabrous or somewhat pubescent: lvs. ovate, toothed,  $1\frac{1}{2}$ -4 in. long, often exceeding the pedicels; calyx usually crimson, the tube twice or more as long as the ovary; petals purple, rose, or white,  $\frac{5}{8}$ -1 in. long, shorter than the calyx-lobes; stamens and style usually well exerted.—Probably mostly hybrid derivatives of *F. magellanica* forms and the larger-leaved larger-flid. Mexican species *F. fulgens*. The fls. show every gradation from short-tubed to those with fls. 3 in. long.

4. *F. triphylla*, L. Bushy plant  $1\frac{1}{2}$  ft. high, pubescent: lvs. often in 3's, small, oblanceolate, petiolate, dentate, green above, purple and pubescent beneath: fls.  $1\frac{1}{2}$  in. long, in terminal racemes, cinnabar-red, the long tube enlarging toward the top; petals very short; stamens 4, not exerted. St. Domingo, W. Indies.

5. *F. arborescens*, Sims (*F. syringæflora*, Carr.). A winter-flowering shrub: lvs. lanceolate-oblong or oblanceolate, entire or nearly so, laurel-like: infl. a naked erect terminal panicle; fls. pink-red, small, lilac-scented; calyx with short tube, its lobes and the petals about equal. Mex.

6. *F. procumbens*, Cunn. TRAILING FUCHSIA. TRAILING QUEEN. Diccious plant with slender trailing much-branched sts., useful for hanging-baskets: lvs. alternate, long-stalked, cordate-ovate,  $\frac{1}{2}$ - $\frac{1}{2}$  in. wide: fls. solitary and axillary, apetalous, the short calyx-tube orange-colored, the obtuse reflexed lobes dark purple; anthers blue: berry glaucous-red. New Zeal.

9. *EUCHARIDIUM*, Fisch. & Mey. Low annuals with bright attractive fls., one well known in gardens; a Calif. genus of 3 species, closely allied to *Clarkia*.—Lvs. mostly alternate: fls. showy, in terminal racemes or spikes, nodding in the bud; calyx with very slender elongated tube widening toward the top; petals with long claw and 3-lobed limb; stamens 4, alternate with the petals; ovary 4-celled; stigma 4-lobed: caps. somewhat 4-angled, 4-valved, many-seeded. (*Eucharidium*: from the Greek for *charming*.)

*E. concinnum*, Fisch. & Mey. (*Clarkia concinna*, Greene. *C. grandiflora*, Greene). Simple below or diffusely branched from base, 1-2 ft. high, glabrous or nearly so: lvs. small, oblong or oval, petioled: fls. sessile, somewhat bilabiate because of the approximate 3 upper petals and distant lower one; calyx with crimson recurved lobes; petals often 1 in. long, rose-purple, long-clawed, 3-lobed: caps. about 1 in. long.

10. *LOPEZIA*, Cav. Species a dozen or more, in Mex. and Cent. Amer.; little grown, but valuable for their interesting forms and gay colors.—Erect branching subshrubs or rarely herbs, glabrous or pubescent: lvs. alternate or the lower opposite, dentate to subentire: fls. usually small, slender-pedicelled, in leafy racemes or subcorymbose at the ends of the branches; calyx-tube scarcely produced beyond the ovary, the limb 4-parted, unequal, deciduous, linear-lobed; petals 4, short- or long-clawed, unequal, the posterior ones narrower, the claws glandular at apex; stamens 2, attached to the pistil, 1 anther-bearing, the other petal-like; ovary 4-celled: caps. globose, coriaceous,

many-seeded; seeds with a granulated coat. (Lope-zia: after the Spaniard, Thomas Lopez, who wrote on the natural history of the New World.)

Petals white, often pinkish-tinged..... 1. *L. albiflora*  
 Petals not white.

Plant shrubby: pedicels usually longer than the subtending lvs..... 2. *L. lineata*  
 Plant annual: pedicels usually shorter than the subtending lvs..... 3. *L. coronata*

1. *L. albiflora*, Schlecht. Shrubby diffuse perennial to 2 ft. high; young branches more or less villous: lvs. petioled, ovate-lanceolate to ovate, cuneate at base, irregularly serrate or remotely dentate to subentire, the largest  $1\frac{1}{2}$  in. long: pedicels horizontally spreading, equaling or longer than the subtending lvs.; petals white, often tinged slightly pinkish at base, the larger ones obliquely spatulate, obtuse or mostly notched, the smaller ones linear, obtuse, equaling or exceeding the calyx-lobes. Late autumn and early winter. Mex.

2. *L. lineata*, Zucc. Shrubby, 3 ft. high, much-branched above, the sts. and petioles usually hairy: lvs. slender-petioled, ovate to lanceolate, acute or obtusish, crenate-serrate to subentire: fls. red, in racemes terminating the branchlets, the slender pedicels longer than the subtending lvs.; posterior petals bearing a single gland. Late summer and winter. Mex.

3. *L. coronata*, Andr. Annual,  $1\frac{1}{2}$ -3 ft. high: lvs. scattered or in whorls, petiolate, ovate to lanceolate, acute or acuminate, serrate or serrulate, glossy and glabrous: fls. rose-colored or lilac, solitary in the axils along at least the upper half of the st., the filiform pedicels commonly exceeded by the subtending lvs.; the 2 upper petals linear, the lateral ones broader and longer. Summer to early autumn. Mex.

11. *GAURA*, L. Annual, biennial, or perennial herbs sometimes grown in the hardy border; species 20-25, confined to the warmer regions of N. Amer. —Lvs. alternate, sessile or stalked, entire, dentate or sinuate: fls. white or rose, in spikes or racemes; calyx-tube deciduous, obconic, much prolonged beyond the ovary, the 4 lobes reflexed; petals clawed, unequal; stamens mostly 8, with a small scale-like appendage before the base of each filament; stigma 4-lobed, surrounded by a ring or cup-like border; ovules usually 4, pendulous: fr. nut-like, 3-4-ribbed, finally 1-celled, 1-4-seeded. (*Gau-ra*: Greek *superb*.)

*G. Lindheimeri*, Engelm. & Gray. Plant 3 ft. high, the st. hairy, more or less branched above: lvs. sessile, lanceolate or spatulate,  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. long, appressed-pubescent, the margin recurved, sinuate and remotely toothed: fls. white, in a loose terminal simple spike or paniculate-spicate infl., only a few in bloom at the same time; petals spatulate, about  $\frac{3}{4}$  in. long: fr. oblong or elliptic-oblong,  $\frac{1}{4}$ - $\frac{3}{8}$  in. long, with acute angles and 1-ribbed faces. Spring and summer. (Named in honor of Ferdinand Lindheimer, discoverer of the plant.) La., Tex.

12. *TRAPA*, L. Floating plants adapted to the aquarium and one furnishing edible frs.; 3 species, native to the warmer parts of the eastern hemisphere. —Aquatic herbs with lvs. of two kinds, the submersed ones opposite, pinnatisect, the emersed ones rosulate, toothed, with spongy inflated petioles: fls. small, axillary, solitary, short-peduncled; calyx-tube short, surrounding the base of the ovary, the 4-parted limb with persistent often spinescent segms.; petals and stamens 4, inserted at the base of an undulate epigynous disk; ovary 2-celled; ovules solitary, pendulous: fr. coriaceous or nut-like, 1-celled, 1-seeded. (*Tra-pa*: abbreviated from *calcitrapa*, which is the same as caltrops, an instrument of war; it has 4 spine-like projections, like the fr. of the common water caltrops.)

*T. natans*, L. **WATER-CHESTNUT. WATER CALTROPS. JESUITS-NUT.** An attractive aquatic, usually with mottled or variegated foliage; submersed lvs. long, slender, feathery; floating lvs. in a loose rosette, li.-stalks swollen and spongy near the apex, the rhombic-orbicular blade dentate along the upper half, slightly villous along the nerves beneath: fls. white, small and inconspicuous: fr. 1-2 in. across, with 4 spinescent angles. Eu., Orient; sparingly naturalized in this country. —Fr. roasted and eaten in some parts of Eu. and Asia like the common chestnut. The water-chestnut of China is the tuber of an *Eleocharis*.



127. HALORAGIDACEÆ. WATER MILFOIL FAMILY

Aquatic or terrestrial herbs, of very diverse appearance, comprising 8 genera and about 100 species of wide distribution.—Lvs. opposite, alternate or verticillate, from linear or pectinate-pinnatifid to very large and kidney-shaped: fls. bisexual or unisexual, regular, often minute, solitary or in axillary clusters or spikes; calyx-tube adnate to ovary, the limb 2–4-lobed or entire; petals 2–4 and deciduous or 0; stamens 1–8, the filaments short; ovary inferior, 1 4-celled with usually 1 ovule in each cell, with 1–4 styles and papillose or plumose stigmas: fr. an indehiscent nutlet or drupe, angular or winged.

Plant aquatic: lvs. pectinate-pinnatifid, whorled or alternate. . . . . 1. MYRIOPHYLLUM  
Plant terrestrial: lvs. ovate or orbicular, usually very large, all radical. . 2. GUNNERA

1. MYRIOPHYLLUM, L. About 20 species of fresh-water herbs, widely dispersed over the world, a few grown in aquaria and ponds.—Lvs. alternate or whorled, pinnatifid into hair-like segms. or the emerged lvs. entire or dentate: fls. monœcious, diœcious, or polygamous, the upper staminate, lower pistillate, and intermediate fls. often bisexual, solitary or spicate, often 2-bracted; calyx-limb 4-lobed or 0; petals 4, often 0 or reduced in pistillate fls.; stamens 4–8; ovary 4-celled with 1 ovule in each cell, the styles 4 and very short: fr. splitting into 4 indehiscent carpels, often tuberculate on back. (Myriophyl-lum: Greek *myriad-leaved*.)

*M. proserpinacoides*, Gill. PARROTS-FEATHER. Sts. weak, growing about 6 in. out of water: lvs. all alike, feathery, in whorls of 4–6, to 1 in. long, with 10–25 hair-like segms: plant diœcious. Chile.

2. GUNNERA, L. Perennial herbs, often gigantic, of about 25 species in the southern hemisphere, the following sometimes grown as lawn foliage plants.—Rhizomes creeping: lvs. all radical, petioled, ovate or orbicular, entire, toothed, or variously lobed: fls. monœcious or polygamous, the upper staminate, lower pistillate, with bisexual fls. between, in spikes or panicles, sometimes the infl. very dense and spadix-like; calyx-lobes 2–3 or 0; petals 2, hooded, or 0; stamens 1 or 2; ovary 1-celled, 1-ovuled, with 2 papillose styles: fr. a drupe. (Gunnera: after J. Ernst Gunner, 1718–1773, Swedish botanist and bishop.)

Lvs. palmately-lobed, not peltate. . . . . 1. *G. chilensis*  
Lvs. pedately-lobed, peltate. . . . . 2. *G. manicata*

1. *G. chilensis*, Lam. (*G. scabra*, Ruiz & Pav.). Rhizome short, sts. thick, ending in a lf.-bud which is surrounded by large laciniate bracts: petiole large and fleshy, green, cylindrical, to 6 ft. long, covered with stiff hairs; lf.-blade rounded, cordiform, attaining 6 ft. in diam., palmately-lobed and incised: infl. a large spike to 3 ft. high, bearing many small spikes with inconspicuous apetalous fls.: fr. red. Chile, Ecuador, Colombia.

2. *G. manicata*, Lind. Differs from *G. chilensis* in its larger stature, the widely spreading rhizome, the gigantic orbicular lvs. which are peltate and pedately-lobed, and the reddish spiny hairs on the petioles. S. Brazil.

128. ARALIACEÆ. ARALIA or GINSENG FAMILY

Herbs, shrubs, and trees, sometimes climbing, upwards of 50 genera and probably 500 species, distributed around the world in both temp. and trop. regions, yielding a good number of subjects of ornamental foliage and habit and some medicinal products.—Sts. sometimes prickly: lvs. simple or in most genera compound or decompound, prevailingly alternate or verticillate: fls. small, greenish or whitish, not separately showy, commonly in umbels or umbellate heads, bisexual or polygamous, regular; calyx very small, adnate to ovary, the margin toothed or obsolete; petals mostly 5, valvate or imbricate, sometimes cohering at apex and falling as a cap; stamens usually as many as

petals and alternate with them, attached on an epigynous disk; ovary 1, inferior, 1- to many-celled, ovule 1 in each cell and pendulous, styles as many as the cells or carpels: fr. a berry or drupe-like.—The family is much like Umbelliferae, but the styles are usually more than 2, the fr. is mostly baccate and lacking in special internal structure, and the species run more into woody subjects. Aside from the genera treated here, certain others are sometimes planted in subtrop. regions or carried under glass, as: *Gilibertia japonica*, Harms (*Dendropanax japonicum*, Seem.), an unarmed shrub with hederate-like foliage; *Oreopanax*, 2 or 3 species from trop. Amer.; *Tupidanthus calypttratus*, Hook. f. & Thom., from India, a glabrous small tree (eventually climbing) with palmate lvs., the long lfts. hanging.

- Lvs. odd-pinnate or multipinnate.
  - Petals imbricate: herbs and deciduous woody plants.....1. ARALIA
  - Petals valvate: evergrowing trop. woody plants.....2. POLYSCIAS
- Lvs. palmate or multipalmate.
  - Styles 10: evergrowing trop. woody plants.....3. DIZYGOTHECA
  - Styles 5 or less.
    - Petals valvate: woody deciduous plants.....4. ACANTHOPANAX
    - Petals imbricate: little herbs.....5. PANAX
- Lvs. simple, often deeply lobed.
  - Plant erect (or not climbing).
    - Fls. 5-merous or more.
      - Styles connate: deciduous, woody.....4. ACANTHOPANAX
      - Styles distinct: lvs. persistent, very large.....6. FATSIA
    - Fls. 4-merous: lvs. persistent, very large.....7. TETRAPANAX
  - Plant normally climbing by rootlets.....8. HEDERA

1. **ARALIA**, L. (*Dimorphanthus*, Miq.). Aromatic herbs, shrubs, and small trees, with some 40 species in Asia, Malaya, Australia, and N. Amer., some of them planted in the open; the greenhouse aralias are species of *Polyscias*, *Dizygotheca*, and other genera.—Sts. spiny or unarmed: lvs. deciduous, alternate, 1- or more pinnate, lfts. serrate: fls. in paniced umbels, often very numerous and thereby showy, on articulated pedicels; calyx-lobes minute or wanting; petals imbricate; stamens 5; ovary usually 5-celled, the 5 styles distinct or connate only at base: fr. a few-seeded little berry or drupe-like body crowned by the styles, often becoming dry. (Ara-lia: etymology unexplained, perhaps from a vernacular name.)—The native spikenard, *A. racemosa*, L., and the Wild Sarsaparilla, *A. nudicaulis*, L., are sometimes colonized or transferred to grounds.

- Plant shrubby or tree-like with very prickly sts.
  - Lfts. stalked, nearly or quite glabrous beneath; rachis with prickles.1. *A. spinosa*
  - Lfts. nearly or quite sessile, pubescent beneath; rachis unarmed....2. *A. chinensis*
- Plant an herbaceous perennial, unarmed.
  - Bracts on infl. inconspicuous.....3. *A. cordata*
  - Bracts lf.-like, often 1 in. or more long.....4. *A. cachemirica*

1. **A. spinosa**, L. **HERCULES CLUB. ANGELICA-TREE.** Tree attaining 30 ft. or more high, but usually known in gardens as a bush or tree-like shrub, with great lvs. clustered at the ends of staff-like very spiny branches: lvs. 2-pinnate, 3-4 ft. long and half or more as broad, the clasping petiole and rachises usually bearing weak prickles; lfts. ovate-acuminate, 2-3 in. long, short-stalked, finely serrate, glabrous or sometimes slightly pilose on veins beneath: fls. in many umbels assembled in great terminal clusters 3-4 ft. long, in midsummer: fr. angled, black, about ½ in. diam. S. Fa. to Mo. and Fla.; frequently planted for the oddity of its thick club-like branches, and sometimes suggestively called Devils Walking-Stick.

2. **A. chinensis**, L. (*A. sinensis* and *A. japonica*, Hort.). **CHINESE ANGELICA.** E. Asian counterpart of *A. spinosa*, but less prickly: lfts. long-ovate to oblong-ovate, 3-6 in. long and long-pointed, coarsely serrate, nearly or quite sessile, petiole and rachises unarmed, pubescent underneath.—Hardy, and very showy when in bloom. Variable. Var. **mandschurica**, Rehd., has lfts. pubescent only on veins beneath. There are kinds with variegated lvs.

3. **A. cordata**, Thunb. **Udo.** Stout spreading unarmed perennial herb, 4-8 ft., the young blanched shoots in spring eaten in Japan, where it is native, and the

plant now introduced in this country for similar purposes: lvs. 3-5-compound; lfts. long-ovate to oblong-ovate, 3-8 in. long, abruptly pointed and short-stalked, cordate, rounded or oblique at base, coarsely serrate, glabrous above, light-colored and more or less hairy on veins beneath; fls. umbelled, in rather large clusters, the bracts small and scale-like: fr. about  $\frac{1}{8}$  in. diam.

4. *A. cachemirica*, Decne. (*A. cashmeriana*, Hort.). Unarmed perennial herb, or becoming woody at base, 5-8 ft., grown for its attractive foliage: lvs. 1-3- or more pinnate; lfts. oblong-ovate or elliptic, 3 in. and more long, short-acuminate, cordate or rounded at base, hairy above, glabrous somewhat hairy on nerves underneath: umbels paniculate, the fls. white and showy in early summer, the infl. with prominent often leafy bracts which are  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long. Himalayas.

2. **POLYSCIAS**, Forst. Shrubs and trees with pungent-aromatic herbage, mostly glabrous, from Madagascar, the tropics of farther Asia and Polynesia, several of which are ornamental glasshouse subjects in temp. countries; the genus is variously understood and the number of species uncertain, probably upwards of 75; some of the cult. kinds rarely bloom. — Lvs. variable, tending to be polymorphous, 1-5-pinnate, in cult. yielding cut-leaved and other abnormal forms: fls. very small, in umbels or heads, sometimes in spikes, assembled in panicles or otherwise, on articulated pedicels, 4-merous or 5-merous (usually the latter); calyx toothed or reduced to a truncate rim; petals valvate; ovary 5-8-celled, with styles usually of same number as cells. (Polyse-ias: Greek *many* and *shade*, from the abundant foliage.)

Lvs. at least 3-pinnate; ultimate lfts. small ..... 1. *P. fruticosa*

Lvs. 1-pinnate, or by monstrosity sometimes 2-pinnate.

Lfts. elongated, entire or pinnatifid along the sides. .... 2. *P. filicifolia*

Lfts. nearly or quite as broad as long, apiculate-dentate.

Base of lfts. tapering. .... 3. *P. Guilfoylei*

Base cordate, lfts. nearly orbicular. .... 4. *P. Balfouriana*

1. *P. fruticosa*, Harms (*Aralia fruticosa*, Hort. *Panax fruticosum*, *P. dissectum* and *P. excelsum*, Hort. *Nothopanax fruticosum*, Miq.). Erect glabrous shrub, 6-8 ft.: lvs. pinnately 3-compound or more finely divided in certain hort.-forms, 1-2 ft. long, the petiole and rachis usually finely spotted; ultimate lfts. narrow-ovate to oblong or lanceolate, 1-4 in. long, stalked, variously serrate to lacinate, the regular serratures spinulose, apex very acute: infl. terminal and in the upper axils, the pedicels short making umbellate little heads; fls. very small, greenish: fr. about  $\frac{1}{2}$  in. long. India to Polynesia. — Cult. in many forms, not often fruiting, some of them with dissected lvs. Var. *plumata*, Bailey, has small lvs., the blade 4-8 in. long, the ultimate segms. small and fine and very narrow; a prevailing series of forms.

2. *P. filicifolia*, Bailey (*Aralia filicifolia*, Moore). Stout glabrous shrub, 6-8 ft., the branchlets and petioles purplish: lvs. 1-pinnate, 1-2 ft. long, polymorphous on the same plant; lfts. all more or less stalked, what may be assumed to be the normal ones (even though less frequent) broad and wholly entire, long-lanceolate to oblong, 3-7 in. long and 2-3 in. broad, subcordate at base, short-pointed; other lvs. with all lfts. longer (often 1 ft.) or at least narrow, long-pointed, taper-based, pinnatifid and sharp-toothed: fls. small, on rather slender pedicels, in little umbels assembled in large diffuse panicles. Pacific Isls., but widely spread in tropics, often under the name *Angelica*.

3. *P. Guilfoylei*, Bailey (*Aralia Guilfoylei*, Bull. *Nothopanax Guilfoylei*, Merr.). Strong erect glabrous shrub to 15-20 ft.: lvs. 1-pinnate, 12-18 in. long, with 2-4 pairs of well-separated stalked ovate, elliptic-ovate to nearly orbicular remotely tip-toothed lfts. 3-5 in. long, with short-pointed or obtusish apex and tapering or at least not cordate base, the petiole usually spotted or lined: fls. small, prominently pedicelled in long-peduncled umbels assembled in large open panicles. Polynesia; early collected by Guilfoyle; now much planted in American tropics, being known as Wild Coffee and Coffee-Tree. — Usually the lfts. are variously edged and blotched white. It runs into many foliage forms, as var. *laciniata*, Bailey, with the white margins cut into narrow spreading very sharp unequal teeth or prongs, often with lfts. of different and odd sizes and shapes; var. *Victoriæ*, Bailey (*Aralia Victoriæ*, Hort.), a more compact form, with small much-divided and cut lfts., commonly grown in pots, the foliage more or less tufted or condensed.

4. *P. Balfouriana*, Bailey (*Aralia Balfouriana*, Hort.). A compact and bushy glabrous strict shrub as ordinarily grown under glass and in tubs, but in the tropics attaining 25 ft. and more, the young sts. usually bronzy-green speckled with gray:

lvs. long-petioled; lfts. mostly 3, prominently stalked, usually white-margined-blotted, orbicular to somewhat reniform, 3-4 in. across, cordate or subcordate, not pointed, coarsely crenate or crenate-dentate, the teeth mostly apiculate; fls. slender-pedicelled in umbels clustered at the nodes on the long naked branches of a large infl. New Caledonia; now dispersed in the tropics.

3. **DIZYGOTHECA**, N. E. Br. A few unarmed woody araliads, probably from the Pacific Isls., distinguished by digitate lvs., 10-celled ovary and 10 styles, and also by 4-celled rather than 2-celled anthers (whence the name *Dizygothe-ca*, *double receptacle*): certain greenhouse aralias are referred here provisionally until fls. and frs. are known; they are probably only juvenile forms of species, with slenderly divided foliage. In ours, the lfts. or digits are 7-11, narrowed to a petiolule-like base, attached at the apex of a long slender petiole; small shrubs as known in pot<sub>cult</sub>. Names of glasshouse stock are subject to much revision.

Margins of lfts. undulate and serrate but not notched.

Lfts. pendulous and filiform..... 1. *D. elegantissima*

Lfts. scarcely pendulous, broader..... 2. *D. Veitchii*

Margins prominently notched..... 3. *D. Kerchoveana*

1. *D. elegantissima*, Vig. & Guill. (*Aralia elegantissima*, Hort.). Petioles mottled white; lfts. 7-11, filiform, pendulous. Perhaps not in cult. in this country.

2. *D. Veitchii*, N. Taylor (*Aralia Veitchii*, Hort.). Lfts. 9-11, about  $\frac{1}{4}$  in. broad, 5-6 in. long, undulate and more or less serrate, shining green above and reddish beneath. Runs into very narrow-leaved forms, as var. *gracillima*, N. Taylor, with nearly filiform lfts. that have a narrow white rib.

3. *D. Kerchoveana*, N. Taylor (*Aralia Kerchoveana*, Hort.). Lfts. 7-11, mostly  $\frac{1}{2}$  in. and more broad, prominently notched on both sides, the midrib pale; petioles handsomely mottled. (Bears the name of Kerchove de Denterghem, Belgian horticulturist.)

4. **ACANTHOPANAX**, Miq. A score or more of shrubs and trees of the E. Asian region, some of them planted in the open for ornament, sometimes climbing.—Often prickly: lvs. palmately lobed or compound, alternate, deciduous: fls. bisexual or polygamo-dioecious, in umbels that often are arranged in large panicles; petals and stamens commonly 5, but sometimes 4, the former valvate; cells of ovary and styles 2-5: fr. a blackish 2-5-seeded little berry. (*Acanthop-anax*: *spiny Panax*.)

*A. pentaphyllum*, March. (*Aralia pentaphylla*, Thunb.). Large shrub or small tree, with arching branches and sharp rather weak spines below the petioles: lvs. palmate, the ovate-oblong or oblong-obovate serrate glabrous rather thin lfts. 5 or 7 and  $2\frac{1}{2}$  in. or less long: umbels on last year's growth, peduncled; styles connate; fls. greenish-white. Japan; planted for shrubbery, apparently only the pistillate plant cult. in this country; there is a var. with white-edged lvs.—*A. ricinifolium*, Seem., is a prickly tree with large 5-7-lobed ricinus-like lvs.; Japan.

5. **PANAX**, L. As here accepted, a half-dozen species of low perennial herbs in N. Amer. and E. Asia, two of which are cult. for the root that is used medicinally by Chinese and others.—Root erect or horizontal, elongated or tuber-like: st. simple, bearing a whorl of 3 or 5 palmate lvs., the lfts. usually 5 and serrate or dentate: fls. in terminal simple umbels, polygamo-dioecious, greenish; calyx obscurely 5-toothed; petals 5, imbricate; carpels and styles 2 or 3: fr. a small drupe-like berry. (*Pan-ax*: Greek, a panacea, *all healing*.)

Lfts. more or less obovate, abruptly acuminate, coarsely serrate or

toothed..... 1. *P. quinquefolium*

Lfts. not obovate, gradually acuminate, finely serrate..... 2. *P. Schinseng*

1. *P. quinquefolium*, L. AMERICAN GINSENG. Glabrous, 6-18 in. high, from a deep spindle-shaped sometimes forked root; scales at base of st. thin and perishing: lfts. oblong-obovate, 3-5 in. long, thin, rather abruptly or boldly narrowed toward apex, the margins coarsely serrate or dentate, nerves on upper surface with few inconspicuous setæ: umbel solitary, with 6-20 pedicelled fls.: fr. nearly  $\frac{1}{2}$  in. diam.,



bright red, on an elongated peduncle. Rich woods, Que., N. Y. to Mo.; also cult. for the roots for export; often defined broadly to include the oriental species (No. 2).

2. *P. Schinseng*, Nees (*P. Ginseng*, C. A. Mey.) ASIATIC GINSENG. Root often divided at end; scales at base of st. fleshy and persistent; lvs. oblong-ovate, gradually tapering to point, finely double-serrate, the nerves above with conspicuous white setæ. Manchuria and Korea; little cult. in this country.

6. *FATSIA*, Decne. & Planch. One glabrous unarmed large bush or small tree, planted in mild regions for subtrop. effect.—Lvs. large, lobed: fls. long-pedicelled, in many paniculate umbels, bisexual or polygamous; calyx with 5 or 6 teeth; petals 5, valvate; stamens 5; ovary 5-celled and with 5 distinct styles: fr. nearly globular, nearly or quite  $\frac{1}{4}$  in. across, black, bearing the spreading styles. (Fat-sia: from a Japanese name.)

*F. japonica*, Decne. & Planch. (*Aralia japonica*, Thunb. *A. Sieboldii*, Hort.). Making a broad bushy subject, reaching 15 or 20 ft., glabrous or soon becoming so, little branched: lvs. stiff, persistent, shiny above, orbicular to reniform in outline, 8-16 in. across, cordate or truncate at base, cut below the middle into 5-9 ovate-oblong dentate and undulate lobes, with sinuses open at bottom; petiole 8-12 in. or more long; lvs. sometimes marked and bordered with golden-yellow: fls. whitish, in summer and autumn, in umbels more than 1 in. across. Japan.

7. *TETRAPANAX*, Koch. One tomentose species, distinguished from *Fatsia* in the sepal-lobes, petals and stamens being 4; ovary 2-celled, styles 2. (Tetrap-anax: four and *Panax*.)

*T. papyrifera*, Koch (*Aralia papyrifera*, Hook. *Fatsia papyrifera*, Benth. & Hook.). Tall stout bush or small spineless tree, the young growth covered heavily with stellate more or less deciduous tomentum: lvs. cordate-ovate in outline, 10-12 in. across, 5-7-lobed to middle or less on either side, margins toothed, upper surface becoming nearly or quite glabrous, lower surface remaining felty: fls. pedicelled, in many globular umbels in a large woolly panicle: fr. small, globular. Formosa; planted in mild climates for its bold effect, and in the Orient for the making of rice-paper.

8. *HEDERA*, L. Ivy. A half-dozen species of root-climbing evergreen shrubs native Eu. to Japan, one of them in common cult. to cover walls and sometimes used for inside decoration.—Lvs. alternate, lobed or entire: fls. bisexual, in umbels assembled in terminal panicles or racemes; calyx 5-toothed; petals 5, valvate; stamens 5; ovary 5-celled, styles joined into 1: fr. a 3-5-seeded small berry. (Hed-era: classical name of the ivy.)

*H. Helix*, L. Polymorphous species, creeping or climbing high on ample support, producing abundant persistent foliage, thinly stellate-pubescent in infl. and on young growth but otherwise glabrous: lvs. widely various, stiffish, usually 3-5-lobed and the margins nearly or quite entire, triangular-ovate to round-ovate to nearly reniform in outline, 3-5 in. across, cordate or truncate at base, veins often light-colored; those on fruiting branches usually ovate and unlobed: fr. globose, commonly black, about  $\frac{1}{4}$  in. across. (*Helix* is Latin name for a kind of ivy.) Canary Isls. to Asia, in many wild and hort. vars.; in this country usually known as English Ivy.—There are races with blotched and variegated lvs. A form growing erect, little if at all climbing, is var. *arborescens*, Loud. (*H. arborea*, Hort.).

## 129. UMBELLIFERÆ. PARSLEY FAMILY

A distinct or "natural" family of about 250 genera and 1,500-2,000 species widely dispersed throughout boreal, temp., and subtrop. regions but rare in the tropics except in the mts.; the name is derived from the prevailing umbellate infl.; many of the species are cult. for food, others for ornament and for medicinal products.—Herbs or rarely shrubs: sts. often hollow: lvs. alternate, mostly compound, the petioles expanded or sheathing at base: infl. consisting of a simple or compound umbel, the secondary being known as umbellets; general umbel often subtended by bracts which form an involucre, the umbellets subtended by bractlets forming the involuclals; fls. small, usually

## UMBELLIFERÆ

bisexual, regular or the outer irregular, epigynous; sepals minute or wanting; petals 5, incurved in the bud; stamens 5, alternating with the petals, inserted around an epigynous disk; ovary 2-celled, each cell 1-seeded; styles 2: fr. (known to gardeners as "seeds") consisting of 2 dry, ribbed or winged, 1-seeded, indehiscent carpels, which commonly separate at base, but remain attached at the top to a slender flexuous Y-shaped stalk (carpophore) from which they dangle; each carpel with 5 lengthwise primary ribs and often 4 intermediate secondary ones, the spaces between the ribs known as the intervals, and the plane of the contiguous faces the commissure; one or more oil-tubes or longitudinal canals carrying aromatic oil often occur in the intervals; the fr. is said to be dorsally compressed when flattened parallel to the plane of the commissural face, laterally compressed when flattened at right angles to the face (the technical structure of fr. is mostly omitted in this account of the horticultural kinds). *D, E, F, G, H*, Fig. 11, page 503.—The apio of Porto Rico and Spanish Amer., grown for its thick edible root, is *Arracacia xanthorrhiza*, Bancr. (*A. esculenta*, DC.); it is perennial with branching starchy yellow-fleshed roots, ternate lvs. with pinnatifid lfts., and compound umbels with involucre; much prized in S. Amer. where it is native. *Hydrocotyle rotundifolia*, Roxb., has been used somewhat in carpet-bedding; it is a slender prostrate rooting perennial with nearly orbicular shining lvs. 1 in. or less across and inconspicuous fls. in small umbels; it is from Asia and Afr. A similar native species is shown at *H* in Fig. 11.

- A. Fls. in involucre heads or spikes: lvs. and bracts often spinose-tipped and more or less spinose-toothed: fr. scaly or tuberculate..... 1. ERYNGIUM
- AA. Fls. in umbels.
  - B. Umbels simple; fls. blue or white: lf-segms. often trifid..... 2. TRACHYMENE
  - BB. Umbels compound.
    - C. Fr. bristly or scaly.
      - D. Lvs. palmately lobed or parted into rather broad segms.: involucre oblanceolate, conspicuous..... 3. ASTRANTIA
      - DD. Lvs. dissected: involucre bracts very narrow and simple or dissected into very narrow segms.
        - E. Lf-segms. many, nearly linear, acute: umbels dense, many-fld..... 4. DAUCUS
        - EE. Lf-segms. few, filiform, acrose-tipped: umbels rather loose, few-fld..... 5. CUMINUM
    - CC. Fr. not bristly nor scaly.
      - D. Outer fls. of the umbellets with petals enlarged and ray-like: ultimate segms. of lvs. narrowly linear: fr. subglobose..... 6. CORIANDRUM
      - DD. Outer fls. of the umbellets not as above.
        - E. Ultimate segms. of lvs. filiform or linear-setaceous.
          - F. Rays equal or nearly so; umbels clustered at tip of st., the central umbel nearly sessile: fr. about ½ in. long... 7. FERULA
          - FF. Rays unequal; umbels not as above: fr. not over ¼ in. long.
            - G. Fr. strongly flattened, the lateral ribs distinctly winged..... 8. ANETHUM
            - GG. Fr. not strongly flattened, the ribs not winged..... 9. FENICULUM
      - EE. Ultimate segms. of lvs. mostly broader.
        - F. Lvs. or lf-segms. mostly ternate.
          - G. Color of fls. greenish-yellow.
            - H. St. stout: involucre bracts deflexed: fr. oblong, with ribs more or less winged..... 10. LEVISTICUM
            - HH. St. slender: involucre bracts not deflexed: fr. ovate, the ribs not winged..... 11. PETROSELINUM
      - GG. Color of fls. white or yellowish-white.
        - H. Rays equal: ultimate lf-segms. ovate or elliptic, not cuneate at base..... 12. ÆGOPODIUM
        - HH. Rays more or less unequal: ultimate lf-segms. mostly cuneate at base.
          - I. Plant biennial or perennial: umbels small, among the lvs., one sessile and several stalked umbels springing from the same joint..... 13. APIUM
          - II. Plant annual: umbels large and loose, not borne as above..... 14. PIMPINELLA
    - FF. Lvs. or lf-segms. mostly not ternate.
      - G. Lf. 1-pinnately compound, the lfts. toothed or lobed.

- H. Color of fls. greenish-yellow; umbels naked; fr. strongly flattened dorsally.....15. PASTINACA  
 HH. Color of fls. white; umbels not naked; fr. somewhat flattened laterally.....16. SIUM  
 GG. Lf. 2- many times compound.  
   H. Plant more or less hairy: fr. three or more times as long as broad.  
     I. Sts. thickly leafy: fr. dark brown or black.  
       J. Primary and secondary divisions of lvs. acuminate: fr.  $\frac{3}{4}$ -nearly 1 in. long.....17. MYRRHIS  
       JJ. Primary and secondary divisions of lvs. acute: fr. about  $\frac{3}{4}$  in. long.....18. ANTHRISCUS  
     II. Sts. sparsely leafy: fr. striped lengthwise.....19. CHÆROPHYLLUM  
 HH. Plant glabrous: fr. not three times as long as broad.  
   I. Ribs of fr. somewhat tuberculate: rays equal or nearly so.....20. CONIUM  
   II. Ribs of fr. smooth: rays very unequal.....21. CARUM

1. **ERYNGIUM**, L. **ERYNGO**. SEA-HOLLY. Wolff, the latest monographer, estimates 220 species, widely dispersed in warm and temp. regions, most abundant in the Medit. region; several are grown for their showy blue heads and often bluish upper lvs. —Glabrous annual or perennial herbs (or rarely shrubby): lvs. mostly rigid, coriaceous, simple, lobed or variously cut, the margins nearly always spiny: fls. small, white, greenish or blue, sessile or subsessile, bracteolate, in involucrate heads or spikes; calyx prominent, mostly rigid, sometimes spinose-tipped; petals erect; disk expanded; styles slender: fr. ovoid or obovoid or more or less globose, scaly or tuberculate, without ribs, the carpels nearly terete and with usually 5 oil-tubes. (Eryn-gium: Greek name for some sort of thistle.)

- Lvs. linear, parallel-veined.....1. *E. aquaticum*  
 Lvs. (at least the st.-lvs.) broader, palmately-veined.  
   Plant about 1 ft. high: lvs. fleshy, the teeth and lobes tipped with stout spines.....2. *E. maritimum*  
   Plant taller: lvs. not fleshy, the teeth and lobes tipped with weak spines if any.  
   Head elongate,  $1\frac{1}{4}$  in. or more long.  
     Bracts of involucre lanceolate or obovate or oblong-lanceolate.  
       Height of plant 2 ft. or more: head about  $1\frac{1}{4}$  in. long....3. *E. alpinum*  
       Height of plant 6 ft.: heads 3-4 in. long.....4. *E. giganteum*  
     Bracts of involucre subulate or linear: head about  $1\frac{1}{2}$  in. long: height of plant 3 ft.....5. *E. Oliverianum*  
   Head not elongate, about  $\frac{1}{2}$  in. long.  
     Root turnip-shaped: plant about 3 ft. high.....6. *E. planum*  
     Root long-cylindric: plant  $1\frac{1}{2}$  ft. high.....7. *E. amethystinum*

1. ***E. aquaticum***, L. (*E. yuccæfolium*, Michx.). **BUTTON SNAKEROOT**. **RATTLE-SNAKE MASTER**. St. 1-6 ft. high, unbranched or branching above: lvs. broadly linear, tapering to a point, rigid, mostly clasping, finely parallel-veined, bristly-margined, the lower sometimes 3 ft. long and  $1\frac{1}{2}$  in. wide: heads clustered, pedunculate, ovate-globose, about  $\frac{3}{4}$  in. long, with linear-lanceolate cuspidate-tipped bracts shorter than the head, the ovate bractlets similar. July-Sept. E. U. S.

2. ***E. maritimum***, L. Plant glaucous-bluish, stiff, much-branched, about 1 ft. high: lvs. fleshy, very stiff, strongly veined, broad-ovate, more or less 3-lobed, with coarse spinose teeth, the basal and lower st.-lvs. with long stout petioles, the upper sessile and clasping: heads nearly globular, pale blue; involucre bracts 5-8, spinose-toothed, much smaller than the lvs.; bractlets with 3 stout spines at tip; sepals ovate-lanceolate, tapering into a stout spinose tip. Eu.

3. ***E. alpinum***, L. St. from a thick root, 2 ft. or more high, branching above; basal lvs. deeply cordate-triangular, acuminate, coarsely double-crenate; st.-lvs. round-cordate, often 3-lobed at apex or palmatifid, the upper bluish-tinged: heads globose-cylindric, about  $1\frac{1}{4}$  in. long, blue or in one var. white; involucre bracts 12-18, lance-oblong, rigid, multifid, spinulose, equaling or surpassing the head; bractlets  $\frac{1}{4}$  in. long; fls. many; sepals ovate-lanceolate, spinose-tipped. July-Aug. Eu.

4. ***E. giganteum***, Bieb. Plant stout, 6 ft. high, the root thick and turnip-shaped, the st. simple below and 4-5-forked above: lvs. leathery, spinulose-dentate or serrate, the basal broadly cordate or cordate-triangular; st.-lvs. more or less 3-lobed: heads cylindric or ovoid-cylindric, 3-4 in. long, in an ample infl., blue or

pale green; involucre bracts lanceolate or obovate, very rigid, much cut, 4 in. long; fls. very many; sepals ovate or ovate-lanceolate, spine-tipped. Caucasus, Asia Minor.

5. *E. Oliverianum*, Delar. (*E. alpinum* var. *Oliverianum*, Spreng.). Hybrid, perhaps of *E. planum* and *E. giganteum*, or perhaps with *E. alpinum*: plant strong, 3 ft. high: lower lvs. long-petioled, broadly cordate-ovate, indistinctly 3-lobed at apex, unequally spinulose-serrate; younger and lower st.-lvs. 3-lobed or -parted, the lobes again more or less lobed or angled and the margins spinose-serrate; upper st.-lvs. palmately 4-5-parted: heads blue, cylindric-ovoid, many-fl'd., about  $1\frac{1}{2}$  in. long; involucre bracts 10-15, subulate or linear, somewhat spinulose, equaling the heads; bractlets 3-cuspidate or the upper entire. (Seeds sent from the East by Oliver.)

6. *E. planum*, L. Plant 3 ft. high, the st. 3-5-forked at top: root thick, turnip-shaped, very long: basal lvs. cordate, oblong or oval or broadly obovate, obtuse, spinulose, usually palmately 7-9-nerved; lower st.-lvs. short-petioled, shaped like the basal lvs. or 3-lobed with lobes deeply serrate or cut; upper lvs. sessile, 3-5-parted: heads blue, ovoid or nearly globular, about  $\frac{1}{2}$  in. long; involucre bracts mostly linear, rarely broader and subfoliaceous, rigid, somewhat spinulose-serrate; bractlets linear, the lower 3-cuspidate, the upper entire and spinose-tipped; sepals lanceolate. July, Aug. Eu., Asia.

7. *E. amethystinum*, L. Plant stout,  $1\frac{1}{2}$  ft. high or more, blue or amethystine above, or sometimes whitish: root thick, long-cylindric: st. remotely leafy, branched, 4-6-forked at top: lvs. rigid, obovate or oblong-ovate, bipinnatifid, spinose-toothed; upper st.-lvs. clasping, pinnately parted, spinulose-toothed: heads ovoid-globose,  $\frac{1}{2}$  in. or more long, the peduncle thick and sulcate; involucre bracts 6-9, unequal, linear-subulate or lanceolate, sharp-pointed; bractlets lanceolate-subulate, the lower 3-cuspidate, the upper entire; sepals ovate-lanceolate. June-Sept. Eu.

2. **TRACHYMENE**, Rudge. A dozen species or more, mostly Australian, but a few from Borneo, New Caledonia, and Celebes, one cult. for its showy fls.—Hirsute or rarely glabrous annual or perennial herbs or sometimes of woody growth: lvs. ternately dissected or rarely undivided, toothed: fls. white or blue, in simple umbels; involucre bracts linear, often connate: fr. often hirsute or tuberculate, laterally compressed. (Trachyme-ne: Greek *rough membrane*, alluding to the fr.)

*T. cœrulea*, R. Graham (*Didiscus cœrulea*, DC.). **BLUE LACE-FLOWER**. Erect annual about 2 ft. high, somewhat hairy: lvs. 1-2-triparted with acute linear or cuneate entire or 3-fid. lobes: fls. blue, very numerous, in umbels 2-3 in. across borne on long peduncles; calyx-teeth obsolete; petals unequal, the external being longer: fr. broader than long, strongly compressed laterally, constricted at the commissure. July-Oct. Australia.—Some persons prefer to keep this species separate in the genus *Didiscus*.

3. **ASTRANTIA**, L. **MASTERWORT**. Perhaps a half-dozen species, native to Eu. and W. Asia, one in common cult. as a border-plant.—Erect glabrous herbs, with branching sts. and dark-colored aromatic roots: lvs. palmately lobed or dissected, petioled, the st.-lvs. often sessile and more nearly simple: umbels irregularly compound or simple, the many bractlets often colored; fls. polygamous, the sterile long-pedicelled, fertile short-pedicelled: fr. ovoid to oblong, subterete or slightly compressed dorsally. (Astran-tia: name in allusion to the star-like appearance of the umbels.)

*A. major*, L. Perennial with st. simple or nearly so, 1-3 ft. high: lvs. mostly in a basal tuft, long-petioled, deeply palmately 5-lobed or -parted, the acute lobes ovate-lanceolate and more or less toothed or cleft; st.-lvs. few, deeply 3-5-lobed, the petioles widely expanded and clasping: umbel compound, the rays unequal, often branching and bearing 2-3 umbellets; involucre resembling the st.-lvs. but sessile; rays often bracteolate midway or at the forks; involucre of 12-20 oblanceolate mucronate often purplish-tinged bractlets surpassing the fls.; umbellets mostly with long-pedicelled sterile fls. and short-pedicelled fertile fls., pinkish, rose or white; calyx-lobes lanceolate and spinulose-tipped, exceeding the petals: fr. obovate-cylindric, the ribs covered with bladdery scales. May, June. Eu.



4. **DAUCUS**, L. More or less weedy plants of about 60 species very widely distributed, one commonly cult. for its fleshy edible roots.—Bristly annual or perennial herbs: lvs. pinnately decompound with small narrow segms.: fls. small, white or yellowish, in compound involucrate umbels: fr. ovate or oblong, more or less dorsally flattened; oil-glands solitary under the secondary ribs. (Dau-cus: ancient Greek name.)

**D. Carota**, L., var. **sativa**, DC. **CULTIVATED CARROT**. Annual or biennial, more or less bristly, with erect much-branched st. 2-3 ft. high, from a thick fleshy tap-root: lvs. mostly on long petioles expanded at base, pinnately decompound, the many ultimate segms. nearly linear and acute: fls. white or yellowish, small and numerous, borne in showy compound many-rayed more or less globose umbels terminating long branches; involucrel bracts lf.-like, cleft into linear divisions: umbellets numerous, globose, the outer fls. with larger and unequal petals, and usually on longer raylets than the inner: fr. oblong,  $\frac{1}{2}$  in. long, bristly along the secondary ribs. Summer.—The wild carrot, *D. Carota*, is native to Eu., N. Afr., and Asia, and is widely spread as a weed in this country; it usually has a flatter umbel than the cult. carrot. (Carota: Latin for carrot.)

5. **CUMINUM**, L. One little herb native to the Medit. region, occasionally cult., its aromatic fr. being used in flavoring.—Slender annual, glabrous except for its fr.: lvs. dissected into filiform divisions: fls. in compound few-rayed umbels with bracts and bractlets narrow and somewhat rigid: fr. narrowly oblong, slightly compressed laterally. (Cu-minum: ancient Greek word.)

**C. Cyminum**, L. (*C. odorum*, Salisb.). **CUMIN**. About 6 in. high, the slender st. branched above: lvs. with few filiform acerose-tipped divisions: umbel few-flid., with short rays and raylets; involucrel bracts simple or with 1-2 very narrow segms.: fls. white or rose-color: fr.  $\frac{1}{4}$  in. long, bristly. Late spring. (Cuminum: same as Cuminum.)

6. **CORIANDRUM**, L. Two species, native to the E. Medit. region, one cult. for its frs. which are used as flavoring.—Glabrous annual herbs, slender and branching: lvs. pinnately dissected, the segms. ovate and incised in the basal lvs., linear in the cauline: umbels compound, the rays commonly few; involucre lacking; involucrel of few filiform bractlets; fls. white: fr. subglobose or ovoid; oil-tubes obscure. (Corian-drum: old Latin name, connected with Greek *bug*.)

**C. sativum**, L. **CORIANDER**. Strong-smelling plant 1-3 ft. high: lvs. pinnately or ternately decompound, the basal and lower st.-lvs. broadly ovate or cuneate and deeply cut, the upper more finely dissected into narrowly linear segms.: outer fls. of the umbellets with enlarged ray-like petals: fr. subglobose, ribbed. July. S. Eu.

7. **FERULA**, L. Large plants of perhaps 60 species, native to S. Eu., N. Afr., and W. Asia, a few cult. as ornamentals for their finely cut lvs. and many umbels of yellow fls.—Glabrous, often glaucous perennial herbs, with thick roots: lvs. pinnately decompound, the ultimate segms. commonly filiform or small: fls. small, in elevated compound many-rayed umbels; bracts and bractlets few to many or sometimes lacking: fr. orbicular or ovate, dorsally compressed, membranous-bordered. (Fer-ula: old Latin name, perhaps from the verb to strike; possibly the sts. were anciently used as ferules.)

**F. communis**, L. (Probably *F. gigantea*, Hort., but not of Fedtsch.). **COMMON GIANT FENNEL**. Plant robust, 8-12 ft. high: lvs. light green, very numerous, forming a mound or clump, the segms. linear-setaceous; lf.-sheaths very large: umbels clustered, the central umbel of a branch nearly sessile, the surrounding ones stalked and mostly of staminate fls.; rays equal or nearly so; fls. greenish-yellow: fr. strongly flattened dorsally, about  $\frac{1}{2}$  in. long. Spring. S. Eu. to Syria.

8. **ANETHUM**, L. Two small herbs, native to the Old World, one widely grown for its frs. which are used as seasoning.—Annual or biennial herbs with branching st.: lvs. 3-4-pinnately divided into long narrowly linear or filiform

segms.: umbels large, naked, with many long rays; fls. yellow, on short pedicels: fr. elliptic, flattened dorsally, the lateral ribs winged. (Ane-thum: Anethon, ancient Greek name of the dill.)

**A. graveolens**, L. DILL. Annual or biennial, 2-3 ft. high, the st. very smooth: lvs. finely dissected, fennel-like: rays somewhat unequal; fls. yellowish, the petals falling early: fr. with dorsal ribs thin and sharp, the lateral with distinct narrow wings. Late summer. Eu.—Seeds and sometimes the foliage used for flavoring. Medicinal preparations are also made from the plant.

9. **FÆNICULUM**, Mill. Old World plants, about 4 species, one commonly cult. for its aromatic frs. and lvs.—Glabrous erect annual, biennial or perennial herbs: lvs. pinnately decompound, the segms. linear or filiform: fls. yellow, in compound umbels; involucre and involucels none; calyx-teeth obsolete: fr. linear-oblong, glabrous, terete or nearly so, the carpels dorsally flattened and prominently ribbed; oil-tubes solitary in the intervals. (Fœnic-ulum: diminutive from the Latin for *hay*, because of its odor.)

**F. vulgare**, Hill. (*F. Fœniculum*, Karst.). FENNEL. Perennial of short duration, cult. as an annual or biennial, more or less glaucous: st. erect, branching, 3-5 ft. high: lvs. 3-4-pinnately compound, the ultimate segms. very narrow and thread-like, the petioles broad and clasping: umbels large, of 15-20 or more rays. Summer and autumn. S. Eu.

10. **LEVISTICUM**, Koch. A single species in the mts. of S. Eu., grown for its aromatic frs.—Glabrous perennial herb: lvs. ternately or pinnately decompound: umbels compound, many-rayed, with involucre and involucels: fr. ovate-oblong, slightly compressed dorsally. (Levis-ticum: origin of name obscure; thought to be a corruption of Ligusticum.)

**L. officinale**, Koch. LOVAGE. Tall: lvs. dark green, shining, 1-2-ternately compound, the segms. ovate-cuneate, coarsely toothed toward the apex: umbels with rays equal or nearly so, the conspicuous involucre of narrow deflexed bracts, the involucels with connate bractlets; fls. greenish-yellow: fr. oblong, the ribs more or less winged; oil-tubes solitary in the intervals; carpophore deeply cleft. Summer. S. Eu.

11. **PETROSELINUM**, Hoffm. About 6 species of European herbs, one cult. for its herbage which is used in cooking and for garnishing.—Annual, biennial, or perennial herbs with 1-3 pinnately compound lvs., the segms. toothed and cut: fls. greenish-yellow or reddish, in compound umbels; involucre with few bracts; involucels with many small lanceolate bractlets: fr. ovate, laterally compressed, the carpels curving outward and apart so that they are contiguous only at base and apex. (Petroseli-num: Greek *rock parsley*.)

**P. hortense**, Hoffm. (*Apium Petroselinum*, L. *Petroselinum sativum*, Hoffm.). PARSLEY. Glabrous biennial or short-lived perennial, with much-branched st. 18-30 in. high: lvs. ternately decompound, the ultimate segms. cuneate-ovate, stalked and deeply cut (in a var. the lvs. curled and crisped, var. **crispum**, Bailey): fls. small, greenish-yellow, in compound umbels with nearly equal rays; involucral bracts not deflexed: fr. about  $\frac{1}{8}$  in. long, conspicuously ribbed. Summer.—One var. is grown for its thick parsnip-like tapering root under the name Turnip-rooted Parsley, var. **radicosum**, Bailey.

12. **ÆGOPODIUM**, L. Two species, native to Eu. and Asia, a variegated form commonly planted as edging and mats against buildings and in shady places.—Coarse herbaceous perennials with creeping rootstocks: lvs. bi-ternately compound, the ultimate segms. ovate or elliptic, serrate or toothed: fls. white or yellow, in compound umbels; bracts and bractlets commonly lacking: fr. ovate, laterally compressed, glabrous, with equal filiform ribs and no oil-tubes. (Ægopo-dium: Greek for *goat* and *little foot*; probably from the shape of its lfts.)

**Æ. Podagraria**, L. GOUTWEED. Glabrous or nearly so, 12-14 in. high: basal and lower st.-lvs. long-petioled, the petiole expanded at base; upper lvs. with short broadly expanded petiole: rays 12-15, equal; fls. white. June. (Podagraria: Greek *foot* and *chain*; the plant an antidote for the gout.) Eu.—A var. cult. for its white-margined lvs.

13. **APIUM**, L. A genus variously understood, but as mostly accepted comprising some 15-20 species widely distributed in temp. regions and in the mts. of the tropics; one species is widely grown in vegetable-gardens.—Annual or perennial herbs, glabrous or rarely somewhat hispidulous: lvs. pinnately or ternately decompound: fls. white, in compound umbels opposite the lvs. or terminal; involueral bracts few or none; involucels of several bractlets or none: fr. ovate or broader than long, laterally compressed, constricted at the commissure; carpels prominently 2-angled, with large oil-tubes solitary in the intervals. (A-pium: Latin for parsley.)

**A. graveolens**, L., var. **dulce**, DC. (*A. Celeri*, Gaertn. *Celeri graveolens*, Britt.). CELERY. Strong-smelling glabrous biennial (perhaps sometimes perennial), the sts. erect, branching, 2-3 ft. high, many-grooved and conspicuously jointed: root-lvs. many and well developed, pinnate, ovate to oblong, with long petioles and rachises usually expanded; lfsts. usually 2-3 pairs and a terminal one, each ternately compound and stalked, the lateral segms. often again divided, the ultimate divisions cuneate-obovate and coarsely toothed or cleft: fls. white, very small, the small compound umbels among the lvs., one sessile and several long-stemmed, naked or leafy-bracteate umbels springing from the same joint; rays somewhat unequal, raylets very short. June-Sept.—Cult. for its lf.-stalks which are blanched and eaten raw or cooked. Var. **rapaceum**, DC. (*A. rapaceum*, Mill.). CELERIAC. Form with thickened and turnip-like edible root for which it is cult.: lf.-stalks not developed.

14. **PIMPINELLA**, L. Herbaceous perennials or rarely annuals, numbering about 75 species, widely dispersed, one cult. for condimental and medicinal purposes.—Perennial or rarely annual herbs, glabrous or with fls. and fr. somewhat hairy: lvs. pinnately or ternately decompound or rarely only toothed: fls. white or yellow, in compound umbels; involueral bracts lacking or rarely 1-2; involucels commonly of few small bractlets: fr. ovate or broader than long, laterally compressed; oil-tubes various. (Pimpinella: possibly from the Latin *bipinnula*, bipinnate.)

**P. Anisum**, L. ANISE. Annual 2 ft. high or less: basal lvs. long-petioled, simple with coarse irregular teeth or ternately compound, the lobes broad and coarsely toothed; st.-lvs. 1-2-pinnate or ternate, the lobes narrow, cuneate, entire or toothed: fls. small, yellowish-white, in large loose umbels: fr. ovate, slightly compressed laterally, constricted at the commissure, the ribs evident. Late summer and autumn. (Anisum: *anysum*, old Arabic name.) Greece to Egypt.

15. **PASTINACA**, L. Strong herbs, probably a dozen, native of Eu. and Asia, one commonly cult. for its large edible root.—Tall biennial or perennial herbs, with thick roots and pinnately compound lvs.: fls. yellow or red, in compound umbels; involuere and involucels commonly none: fr. glabrous, oval or oblong, much flattened dorsally, broadly margined by the contiguous winged lateral ribs of the 2 carpels; oil-tubes solitary in the intervals and 2-4 on the commissural side. (Pastinaca: Latin *pastus*, food.)

**P. sativa**, L. CULTIVATED PARSNIP. Robust biennial (rarely annual), mostly glabrous, with thickened tap-root which may become 18-20 in. long and 4 in. or more in diam. at the crown: st. grooved and becoming hollow, branching, 3-5 ft. high: lvs. odd-pinnate, with 3-4 pairs of sessile ovate or oblong toothed and more or less lobed lfsts.: fls. greenish-yellow, in naked compound umbels with unequal rays: fr. thin and strongly flattened dorsally, oblong to rotund-oblong, wing-margined, strongly ribbed,  $\frac{2}{3}$ - $\frac{1}{2}$  in. long. Summer. Eu.—Var. *sylvestris*, DC., the wild parsnip, is extensively naturalized in this country.

16. **SIUM**, L. Ten species in the northern hemisphere and in S. Afr., one grown for its thickened edible root which is used in the same way as salsify.—Glabrous herbs: lvs. pinnate, the pinnæ dentate or entire: umbels compound, terminal or lateral, bracts of the involucre and involucels numerous; fls. white: fr. ovate or oblong, laterally compressed or constricted at the commissure; oil-tubes many. (Si-um: old Greek name for a marsh plant.)

S. **Sisarum**, L. SKIRRET. Tuberous-rooted plant 1–3 ft. high: lvs. odd-pinnate with 1–3 pairs of lanceolate toothed lfts.: fls. small, in compound terminal umbels; involucre and involucels present: fr. ribbed, the carpels more or less curved, with usually 3 ribs on back and 1 on either edge. (Sisarum: from the Greek name for a plant with an esculent root.) E. Asia.

17. **MYRRHIS**, Scop. MYRRH. One species native to Eu. and an immigrant to other countries, sometimes grown for its pleasing odor.—Perennial herb with the habit of *Chærophyllum*: lvs. pinnately decompound, the segms. pinnatifid and toothed: umbels compound, many-rayed; involucral bracts 1–2 or none; involucels membranaceous; fls. white: fr. oblong-linear, constricted at the commissure; oil-tubes numerous, very fine and obscure. (Myrr-his: from the Greek word for *perfume*.)

M. **odorata**, Scop. MYRRH. SWEET CICELY of Eu. Hirsute-pubescent, erect, branching, 2–3 ft. high: lvs. thin and soft, 2–3-pinnately compound, with narrow-toothed or pinnatifid lanceolate segms: fls. small, whitish, polygamous, in a strict compound umbel with unequal rays and without involucre; involucels of about 6 lanceolate bractlets: fr. shining brown,  $\frac{3}{4}$  to nearly 1 in. long, strongly ribbed and angled, the carpels beaked, the carpophore strongly cleft. Summer. Eu.

18. **ANTHRISCUS**, Hoffm. Small herbs; 10 or a dozen species indigenous to the regions of the Caucasus, S. Russia, and W. Asia, often found in vegetable-gardens, the lvs. being used like parsley.—Annual, biennial, or rarely perennial, hirsute or sometimes glabrous: lvs. pinnately or subternately decompound, the segms. pinnatifid or toothed: fls. white, in compound umbels; involucral bracts 1–2 or none; involucels of several bractlets: fr. ovate or oblong, shortly attenuate at apex, laterally compressed or constricted at the commissure; oil-tubes very small, solitary in the intervals. (Anthriscus: ancient name, probably Greek *flower* and *fence*, in reference to its usual station.)

A. **Cerefolium**, Hoffm. (*Scandix Cerefolium*, L.). SALAD CHERVIL. More or less hairy fine-leaved annual, with erect branching st. 1–2 ft. high: radical and main st.-lvs. decompound, the ultimate lfts.  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, ovate to orbicular and deeply cut: fls. white, minute, in compound rather strict umbels: fr. black, smooth, beaked,  $\frac{1}{4}$ – $\frac{3}{8}$  in. long, the carpels linear, grooved on the inner face. Summer. (Cerefolium: from *Chærophyllum* which this species resembles, or named from the goddess Ceres.) Caucasus, S. Russia, W. Asia.

19. **CHÆROPHYLLUM**, L. Between 30 and 40 species of the northern hemisphere, one of which is cult. for its fleshy edible root.—Annual, biennial, or perennial herbs, glabrous or hirsute, the root often tuberous or fusiform: lvs. pinnately or rarely ternately decompound, the segms. broad and pinnatifid or toothed, or narrow and fascicled: umbels compound, many-rayed; involucral bracts 1–2 or none; fls. white or rarely yellow: fr. oblong or linear, compressed laterally or constricted at the commissure; carpels subterete or 5-angled; oil-tubes solitary in the intervals. (Chærophyl-lum: Greek-made name referring to the agreeably scented foliage.)

C. **bulbosum**, L. TURNIP-ROOTED CHERVIL. Erect branching biennial, more or less hairy, the st. 2–3 ft. high from an underground spindle-shaped tuber 2–4 in. long: lvs. decompound, the ultimate segms. linear: fr. about  $\frac{1}{4}$  in. long, the carpels nearly linear, more or less curved, the broad ribs separated by dark-colored furrows giving the fr. a striped appearance. Eu.



20. **CONIUM**, L. Two species widely distributed, one known for its medicinal qualities.—Tall glabrous biennial herbs: lvs. pinnately decompose, the segms. pinnatifid and toothed: fls. white, in compound many-rayed umbels with few bracts and bractlets: fr. broadly ovate, laterally compressed and at the commissure more or less constricted; carpels 5-ribbed, without oil-tubes. (Coni-um: Greek name.)

**C. maculatum**, L. POISON-HEMLOCK. A rank poisonous much-branched herb 2-4 ft. high, with finely cut dark foliage and large umbels of small white fls.; rays equal or nearly so: fr. not bristly. Eu., and extensively run wild.

21. **CARUM**, L. Twenty or more species widely distributed in temp. regions, one cult. for its frs. which are used in flavoring.—Glabrous annual or perennial herbs with lvs. pinnate or ternate or pinnately decompose: umbels compound, few- to many-rayed; involucre bracts few or none; involucels of several entire bractlets or none; fls. white or yellow: fr. ovate or oblong, laterally compressed, and often constricted at the commissure, the carpels 5-angled, with oil-tubes solitary (rarely 2) in the intervals. (Ca-rum: probably from Caria in Asia Minor.)

**C. Carvi**, L. CARAWAY. St. slender, erect, furrowed, 1-2 ft. high: lvs. pinnately decompose into narrowly linear segms.: rays and raylets unequal; involucre bracts very narrow; fls. white: fr. oblong, constricted at the commissure, strongly ribbed. June, July. (Carvi: derived from Carum.) Old World; somewhat naturalized in this country.

### 130. CORNACEÆ. DOGWOOD FAMILY

About 10 genera and 85 species, most abundant in the northern hemisphere, several of which are planted for ornament and cover.—Shrubs and trees, rarely herbs, with simple lvs. commonly opposite (or in a few important species alternate): fls. polygamous, diœcious, or bisexual, in terminal clusters; calyx-limb 4-5-toothed or none; petals 4-5 or 0; stamens equaling or outnumbering the petals, inserted with them at the base of a disk; ovary inferior, in ours 1-2-celled; style 1: fr. a 1-2-seeded drupe. I, Fig. 11, page 503.

Lvs. deciduous, entire: fls. usually white; ovary 2-celled.....1. CORNUS  
Lvs. evergreen, commonly toothed: fls. purple; ovary 1-celled.....2. AUCUBA

1. **CORNUS**, L. Dogwood. About 40 described species, natives of the north temp. zone, or a few in Mex., the Himalayas and Afr.—Mostly shrubs or trees, with simple entire opposite or rarely alternate deciduous lvs.: fls. (in ours) bisexual, 4-merous, small, white or greenish-white, in terminal cymes, panicles, umbels or heads, with or without involucre; stamens 4; ovary 2-celled; stigma truncate or capitate: fr. a 2-celled 2-seeded drupe. (Cor-nus: Latin horn, from the toughness of the wood.)

Fls. in cymes or panicles without involucre.

Lvs. alternate: fls. in umbel-like cymes, cream-colored.....1. *C. alternifolia*

Lvs. opposite.

Fr. white or blue: pubescence of straight hairs.

Inf. an umbel-like flat cyme: lvs. broadly ovate or elliptic to ovate-lanceolate.

Color of fr. white or bluish-white: pubescence on lvs. uniformly distributed.

Sts. usually stoloniferous: lvs. acute or short-acuminate: disk commonly red: fr. with stone usually broader than high.....2. *C. stolonifera*

Sts. not stoloniferous: lvs. gradually acuminate: disk yellow: fr. with stone usually higher than broad.....3. *C. alba*

Color of fr. blue or bluish, sometimes partly white or greenish-white: pubescence of lvs. mostly on veins.....4. *C. Amomum*

Inf. a broad panicle: lvs. ovate-lanceolate to lanceolate: fr. white.....5. *C. racemosa*

Fr. black (green in one var.): pubescence somewhat woolly.....6. *C. sanguinea*

Fls. in dense heads or umbels, with involucre.

Frs. in dense clusters, but individually distinct.

Color of fls. yellow; involucre yellowish, not exceeding the fls.....7. *C. mas*

Color of fls. greenish-yellow; involucre white or red, showy, much exceeding the fls., corolla-like. . . . . 8. *C. florida*  
 Frs. connate into a globular fleshy head. . . . . 9. *C. Kousa*

1. *C. alternifolia*, L. f. ALTERNATE-LEAVED or PAGODA DOGWOOD. Shrub or small tree to 25 ft., the branches in irregular whorls forming flat horizontal tiers: lvs. alternate, slender-petioled, elliptic or ovate, 2-4 in. long, usually cuneate at base, abruptly acuminate, nearly glabrous above, pale and appressed-pubescent beneath: cymes without involucre,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. wide; fls. creamy-white, fragrant: fr. dark blue (rarely yellow), globular,  $\frac{1}{2}$  in. across, on red peduncles. Que. to Minn. and S.

2. *C. stolonifera*, Michx. RED-OSIER DOGWOOD. Shrub to 10 ft. high, usually with dark blood-red branches and prostrate sts., stoloniferous: lvs. ovate or ovate-lanceolate, 2- $4\frac{1}{2}$  in. long, obtuse at base, acute or short-acuminate, appressed-pubescent above and beneath: cymes dense, 1-2 in. wide, flat-topped; disk commonly red: fr. globose, white to bluish, the stone usually broader than high. Widespread in U. S. and far northward.

3. *C. alba*, L. TATARIAN DOGWOOD. Shrub to 10 ft., with usually erect st., the branches bright blood-red or in some vars. bright coral-red or dark purple: lvs. ovate or elliptic,  $2\frac{1}{2}$ -5 in. long, obtuse or cuneate at base, rather gradually acuminate, roughish appressed-pubescent above and below, margined or variegated with white or yellow in some vars.: cymes dense, small; disk yellow: fr. ovoid, bluish-white or whitish; stone usually higher than broad, flat. Siberia, N. China.

4. *C. Amomum*, Mill. (*C. sericea*, L.). SILKY DOGWOOD. Shrub to 10 ft., with purple branches: lvs. ovate to ovate-lanceolate, 2-4 in. long, rounded or narrowed at base, rather long-acuminate, usually brownish woolly-pubescent beneath especially on the veins, glabrous or nearly so above: cyme flat, compact,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. broad: fr. globose, blue or sometimes partly white. (Amomum is an old Greek name, see page 203, early applied also to some plant, in New England, which Miller supposed this Cornus to be.) Newf. to Ont., Fla. west to N. D. and Tex.

5. *C. racemosa*, Lam. (*C. paniculata*, L'Her.). PANICLED DOGWOOD. Shrub 6-15 ft. high, with gray branches: lvs. ovate-lanceolate to lanceolate, 1-3 in. long, cuneate at base, gradually acuminate, appressed-pubescent to nearly glabrous: fls. in round-topped or pyramidal panicles 1-2 in. broad; fls. white on red peduncles: fr. white. Me. to N. C. west to Minn. and Neb.

6. *C. sanguinea*, L. BLOOD-RED DOGWOOD. Shrub to 12 ft., usually with purple or dark blood-red branches: lvs. broad-elliptic or ovate,  $1\frac{1}{2}$ -3 in. long, rounded or narrowed at base, abruptly and shortly acuminate, in one var. variegated, usually pubescent on both sides, the hairs beneath somewhat woolly: fls. greenish-white, in dense cymes: fr. black or in one var. green. Eu., Orient.

7. *C. mas*, L. (*C. mascula*, Hort.). CORNELIAN CHERRY. Shrub or small tree to 20 ft.: lvs. very short-petioled, ovate or elliptic (in one var. rotund-ovate),  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. long, rounded or narrowed at base, acute or acuminate, appressed-pubescent, glossy-green or in some vars. white-bordered or variegated: fls. yellow, in umbels terminating short lateral branchlets, before the lvs.; involucre yellowish, about as long as the pedicels: fr. oblong, scarlet,  $\frac{3}{4}$  in. long, edible. S. Eu., Orient.

8. *C. florida*, L. FLOWERING DOGWOOD. Shrub or small tree 10-15 ft., rarely to 40 ft., with branches spreading or in one var. pendulous: lvs. rather short-petioled, ovate or elliptic-ovate, 2- $4\frac{1}{2}$  in. long, narrowed at base, acute or rather abruptly acuminate, appressed-pubescent or above glabrous: fls. greenish-yellow, sessile, with a white or pinkish involucre varying to red, 3-4 in. wide; bracts 4, obovate, emarginate: fr. scarlet,  $\frac{1}{2}$  in. long, in dense clusters but individually distinct. Mass. to Fla. west to Ont., Tex., and Mex.—The form with red fls. (involucres) is specially propagated.

9. *C. Kousa*, Buerg. KOUSA. Shrub or small tree to 20 ft.: lvs. short-petioled, elliptic-ovate, 2-4 in. long, rounded or narrowed at base, abruptly long-acuminate, shortly appressed-pubescent: fls. greenish-yellow, sessile, with a creamy-white involucre  $2\frac{1}{2}$ -3 in. wide; bracts ovate, acute: frs. connate into a globular fleshy head. (Kousa: Japanese vernacular name.) Japan, China.

2. AUCUBA, Thunb. Species 3 (often considered as vars. of one polymorphous species), natives of E. and E. Cent. Asia, grown in tubs and out-of-doors for the ornamental foliage.—Dioecious evergreen shrubs with stout branches: lvs. opposite, coarsely and remotely dentate or serrate to entire, green or blotched with yellow or white, on short petioles: fls. small, purple,

in terminal panicles, the pistillate with an inferior 1-celled ovary, short style and oblique stigma: fr. a 1-seeded berry-like drupe. (Aucu-ba: Latinized from its Japanese name.)

- Lvs. ovate, oblong or oblong-lanceolate, obtusely acuminate: petals obtusely acuminate..... 1. *A. japonica*  
 Lvs. narrower, sharply acuminate: petals long and slenderly acuminate. . 2. *A. himalaica*

1. *A. japonica*, Thunb. Stout shrub 4–15 ft. high: lvs. ovate or oblong or sometimes oblong-lanceolate, 3–7 in. long, coarsely toothed above the middle, obtusely acuminate or acute, dark green and shining, in vars. often yellow-spotted and known as Gold-dust Tree: petals obtusely acuminate: berries scarlet, rarely white or yellow, usually oblong. Himalayas to Japan.—*A. crotonifolia*, Hort., is probably a var. of *A. japonica*, with large green croton-like (codium-like) lvs. spotted with white.

2. *A. himalaica*, Hook. f. & Thoms. Differs from *A. japonica* in its lvs. narrower and sharply acuminate: petals long and finely acuminate: fr. orange to scarlet. E. Himalayas.

### 131. CLETHRACEÆ. WHITE ALDER FAMILY

Only 1 genus of about 30 species of shrubs or small trees distributed in trop. and subtrop. regions of both hemispheres, one often planted for ornament.—Lvs. alternate, petioled, simple: fls. bisexual, regular, in terminal racemes or panicles; calyx deeply 5-parted, imbricated, persistent; corolla of 5 nearly separate deciduous petals; stamens 10, hypogynous, the anthers at first inverted, later erect, opening by terminal pores; ovary superior, 3-celled with numerous ovules in each cell, stigma 3-lobed: fr. a caps. loculicidally dehiscent by 3 valves.

**CLETHRA**, L. Technical characters as for the family. (Cle-thra: ancient Greek name of the alder, probably applied here from the resemblance of the lvs.)

*C. alnifolia*, L. SWEET PEPPERBUSH. Deciduous shrub to 10 ft. high: lvs. obovate or cuneate, 2–4 in. long, acute, short-petioled, sharply serrate at least above middle, glaucous or nearly so: fls. white (or pink in var. *rosea*), in erect, simple or paniced, pubescent racemes in July–Sept., the pedicels subtended by narrow caducous bracts; style much longer than calyx in fr. Me. to Fla.

### 132. ERICACEÆ. HEATH FAMILY

Shrubs, subshrubs, or small trees of wide distribution, consisting of about 70 genera and 1,400 species; the family furnishes many highly ornamental subjects and several are grown for their edible frs.—Lvs. alternate, opposite or verticillate, simple, exstipulate, deciduous or evergreen: fls. bisexual, regular or slightly irregular, solitary or in axillary or terminal racemes or panicles; calyx free or adnate to ovary, 4–5-cleft or -parted, usually persistent; corolla gamopetalous or rarely polypetalous, 4–5-lobed; stamens as many or twice as many as petals, inserted on outer edge of an epigynous or hypogynous disk, the 2-celled anthers opening by terminal pores or chinks or rarely longitudinally, sometimes awned, the pollen preponderantly of 4 united grains; ovary superior or inferior, usually 2–5-celled with 1 to many ovules in each cell, mostly many, the placenta commonly axile; style and stigma 1: fr. a caps., berry or drupe.—*Vaccinium* and related genera are sometimes separated as family VACCINIACEÆ. *A*, *B*, *C*, Fig. 12, page 570.

*A*. Ovary superior.

*B*. Lvs. small and heath-like: corolla withering-persistent.

*c*. Calyx much shorter than corolla..... 1. *ERICA*

*cc*. Calyx much longer than corolla and concealing it..... 2. *CALLUNA*

*bb*. Lvs. not heath-like: corolla deciduous.

*c*. Fr. a berry or drupe.

*d*. Fls. usually solitary..... 3. *PERNETTIA*



FIG. 12. VARIOUS STRUCTURES ERICACEÆ TO SCROPHULARIACEÆ.

A, *Kalmia latifolia*; Aa, flowers side and front view. B, *Leucothoe*; Bb, flower, and anthers at left. C, *Azalea* (*Rhododendron viscosum*) with separate flower beneath. D, *Anagallis arvensis*, with detached flower and a capsule. E, *Ligustrum*, showing separate flower, pistil, anthers back and side view. F, *Asclepias* flower, separate member of corona, pod. G, *Nymphaeoides peltatum*. H, *Solanum Dulcamara*, inflorescence and separate flower. I, *Symphytum officinale*. J, *Cunila*; Jj, flower enlarged. J, lower left, *Catnip* (*Nepeta Cataria*), and details. K, *Monarda*, with details at right and beneath. L, *Nepeta hederacea*. M, Flower, capsule side view. N, *Veronica*, single flower, capsule at top dehiscent, capsule side view. O, *Linaria vulgaris*, twig with two flowers at right and one detail at left. P, *Mimulus ringens*, with details. Q, *Pedicularis*, side view of flower at right, upper lip spread open at left below.



- DD. Fls. in terminal racemes or panicles.  
 E. Ovules many in each cell..... 4. ARBUTUS  
 EE. Ovules 1 in each cell..... 5. ARCTOSTAPHYLOS  
 CC. Fr. a dehiscent caps.  
 D. Anther-sacs opening longitudinally.  
 E. Plant creeping: corolla salverform..... 6. EPIGÆA  
 EE. Plant a tree: corolla cylindric..... 7. OXYDENDRUM  
 DD. Anther-sacs opening by a terminal pore.  
 E. Corolla with 10 pouches for the anthers..... 8. KALMIA  
 EE. Corolla without pouches.  
 F. Calyx- and corolla-lobes 4; stamens 8..... 9. DABOECIA  
 FF. Calyx- and corolla-lobes 5; stamens mostly 5 or 10.  
 G. Seeds 1 or few in ovary and caps..... 10. ENKIANTHUS  
 GG. Seeds many in ovary and caps.  
 H. Caps. septicidally dehiscent: fls. large; anthers  
 often exerted..... 11. RHODODENDRON  
 HH. Caps. loculicidally dehiscent: fls. small; anthers  
 included.  
 I. Fls. open-campanulate..... 12. ZENOBIA  
 II. Fls. cylindrical or urceolate.  
 J. Calyx imbricated at least in bud: sutures of  
 caps. not thickened..... 13. LEUCOTHOË  
 JJ. Calyx valvate or distinct: sutures of caps.  
 thickened..... 14. PIERIS  
 AA. Ovary inferior..... 15. VACCINIUM

1. *ERICA*, L. HEATH. Nearly 500 species of shrubs and subshrubs native in S. Afr. and the Medit. region, a few species more or less grown in this country under glass and planted out-of-doors.—Lvs. usually in whorls of 3–6, needle-like: fls. solitary or in few- to many-fl'd. axillary or terminal umbels or spikes, usually nodding; calyx short, 4-parted; corolla withering-persistent, urceolate to long-cylindrical, with 4 small lobes; stamens usually 8; ovary 4- or rarely 8-celled with 2 to many ovules in each cell: fr. a loculicidally dehiscent caps. with many minute seeds. (*Eri-ca*: ante-Linnæan name of doubtful significance.)

- A. Lvs. markedly ciliate.  
 B. Whorls of 3 lvs..... 1. *E. ciliaris*  
 BB. Whorls of 4 lvs.  
 C. Length of fls. about  $\frac{1}{4}$  in.  
 D. Sepals not reflexed: lvs. not rough..... 2. *E. Tetralix*  
 DD. Sepals reflexed: lvs. rough or tuberculate..... 3. *E. Bergiana*  
 CC. Length of fls.  $\frac{1}{2}$ –1 in.  
 D. Fls. in dense umbels at ends of branchlets..... 4. *E. ventricosa*  
 DD. Fls. borne all along branchlets, forming a leafy raceme..... 5. *E. hyemalis*  
 AA. Lvs. glabrous or essentially so.  
 B. Stamens exerted.  
 C. Whorls of 3 lvs..... 6. *E. melanthera*  
 CC. Whorls of 4 or 5 lvs.  
 D. Sepals narrow-oblong, half or more as long as corolla.  
 E. Plant less than 1 ft. high, the branches becoming prostrate..... 7. *E. carnea*  
 EE. Plant 4 ft. or more high, the branches upright..... 8. *E. mediterranea*  
 DD. Sepals ovate, one-third or less as long as corolla..... 9. *E. vagans*  
 BB. Stamens included.  
 C. Blooming in summer, June–Sept.  
 D. Whorls of 3 lvs..... 10. *E. cinerea*  
 DD. Whorls of 4 lvs..... 11. *E. stricta*  
 CC. Blooming in winter or spring.  
 D. Plant 8 ft. or more high.  
 E. Hairs on st. short and slender, simple..... 12. *E. lusitanica*  
 EE. Hairs stout and large, ciliate..... 13. *E. arborea*  
 DD. Plant 1–2 ft. high.  
 E. Corolla urceolate..... 14. *E. gracilis*  
 EE. Corolla campanulate..... 15. *E. subdivaricata*

1. *E. ciliaris*, L. Much-branched shrub 1 ft. or more high, with prostrate sts. pubescent when young: lvs. in whorls of 3, ovate, ciliate on margins with glandular hairs: fls. in whorls of 3 in terminal racemes, blooming from July–Oct., rosy-red, about  $\frac{1}{2}$  in. long; sepals ciliate, one-third or more shorter than corolla which is contracted toward mouth; ovary glabrous. Eu.

2. *E. Tetralix*, L. From 6 in. to 2 ft. high, the branches becoming prostrate: lvs. in whorls of 4, whitish beneath, ciliate on margins with glandular hairs: fls. few to several in a terminal head, blooming from June to Oct., rose, about  $\frac{1}{4}$  in. long; sepals ciliate, about one-third length of the cylindrical corolla; ovary downy.

(*Tetralix*: pre-Linnæan substantive signifying *cross-leaved*.) Eu.—**E. Mackayi**, Hook., is regarded by some as a var. and by others as a hybrid between *E. Tetralix* and *E. ciliaris*; its fls. are of a deeper red and shorter and broader and ovary not so downy as in *E. Tetralix*.

3. **E. Bergiana**, L. (*E. cupressina*, Sincl. *E. turrigera*, Salisb.). Erect shrub 1-3 ft. high: lvs. in whorls of 4, ciliate, usually rough with tubercle-based hairs: fls. in whorls of 4, blooming May-June, red,  $\frac{1}{2}$ – $\frac{1}{4}$  in. long; sepals ciliate, reflexed, about one-third length of the urceolate corolla; ovary glabrous. (Named after D. D. Bergius, who wrote on S. African plants.) S. Afr.

4. **E. ventricosa**, Thunb. Rigid shrub from 2-6 ft. high: lvs. in whorls of 4, margins ciliate and white: fls. in dense umbels at ends of branchlets, blooming in spring and summer, waxy-white, pink, or red,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long; bracts ciliate; sepals glabrous, one-half or less as long as glabrous corolla which is ovoid-urceolate and constricted at throat. S. Afr.—There are a number of hort. vars. chiefly differing in size and color of fls.

5. **E. hyemalis**, Nichols. To about 2 ft. high: lvs. in whorls of 4, ciliate: fls. on the ends of short branchlets, forming a long dense leafy raceme, blooming from Nov.-Feb., pink with white at apex or white in var. *alba*,  $\frac{3}{4}$ –1 in. long; sepals ciliate, about one-third length of corolla. Of doubtful origin; probably a hybrid.

6. **E. melanthera**, L. A profusely-blooming compact shrub to 2 ft. or more high: lvs. in whorls of 3, slightly scabrous when young: fls. many toward the ends of the branchlets, blooming in winter, rosy, about  $\frac{1}{2}$  in. long; sepals colored, nearly or quite half as long as corolla, the bracts often crowded and imbricating the calyx; segms. of corolla broadly rounded, about equaling tube; anthers nearly black, exserted. S. Afr.

7. **E. carnea**, L. (*E. herbacea*, L.). Low tufted shrub 6-10 in. high, the branches becoming prostrate and spreading: lvs. in whorls of 4, glabrous and glossy: fls. solitary or in pairs in the axils of lvs., forming a raceme 1-2 in. long on branchlets of previous year, blooming Feb.-Apr., deep red,  $\frac{1}{4}$  in. or less long; sepals narrow-oblong, more than half as long as cylindrical corolla; anthers dark red, exserted. Alps.

8. **E. mediterranea**, L. Bushy upright shrub 4-10 ft. high: lvs. in whorls of 4-5: fls. solitary or in pairs in axils of lvs., at ends of branchlets of previous year, forming short racemes, blooming in spring, deep red or white in var. *alba*,  $\frac{1}{4}$  in. or less long; sepals narrow-oblong, half as long as cylindrical corolla; anthers dark red, exserted. S. Eu.

9. **E. vagans**, L. CORNISH HEATH. Low spreading shrub to about 1 ft. high: lvs. in whorls of 4 or 5: fls. usually in pairs in axils of lvs., forming a leafy cylindrical raceme, blooming from July-Oct., purplish-pink or white in var. *alba*, about  $\frac{1}{8}$  in. long; sepals ovate, one-third or less as long as the almost globular corolla; anthers red or rarely yellow, exserted, split to base. S. W. Eu., Cornwall.

10. **E. cinerea**, L. Much-branched low shrub from 6-18 in. high: lvs. in whorls of 3: fls. in whorls forming a short raceme or in terminal umbels, blooming June-Sept., purple changing to blue, about  $\frac{1}{4}$  in. long; sepals about one-third as long as urceolate corolla. Eu.—There are white- and scarlet-fl. forms.

11. **E. stricta**, Donn. CORSICAN HEATH. Erect shrub to 9 ft. high, with strict rigid branches: lvs. in whorls of 4 or rarely 5-6: fls. in terminal umbels, blooming June-Sept., rosy-purple, about  $\frac{1}{4}$  in. long; sepals about one-third as long as cylindrical corolla which is narrowed at throat. S. W. Eu.

12. **E. lusitanica**, Rudolph (*E. codonodes*, Lindl.). SPANISH HEATH. An erect dense shrub becoming 8-12 ft. high: sts. when young clothed with short slender simple hairs: lvs. irregularly arranged or from 3-5 in a whorl: fls. produced in great profusion along entire length of branches, from Feb.-Apr., white or pink, about  $\frac{1}{6}$  in. long; sepals about one-fourth the length of the tubular-campanulate corolla. W. Eu.

13. **E. arborea**, L. TREE HEATH. Shrub or sometimes tree with distinct trunk, to 20 ft. high: differs from *E. lusitanica* in the hairs of the st. being long, stout, and ciliate, the more globular almost white fls. about  $\frac{1}{8}$  in. long which are very fragrant, and the much flattened white stigma. Medit. region and Caucasus.

14. **E. gracilis**, Wendl. Erect shrub less than 1 ft. high: lvs. in whorls of 4: fls. usually in whorls of 4 on the ends of the branchlets, blooming in Feb.-Mar. or in var. *autumnalis* in the fall, rosy, about  $\frac{1}{6}$  in. long; sepals about one-third length of urceolate corolla which is contracted at mouth. S. Afr.

15. *E. subdivaricata*, Berg. (*E. persoluta*, L.). Erect branching shrub 1-2 ft. high: lvs. in whorls of 4: fls. in whorls of 4 or more at ends of short branchlets, forming a racemose infl., blooming in spring, white or rosy, about  $\frac{1}{6}$  in. long; sepals one-half or less as long as campanulate corolla which is widened at mouth. S. Afr.—Several vars. are known, but the differences from the type are scarcely perceptible.

2. *CALLUNA*, Salisb. HEATHER. A monotypic genus native in Eu. and Asia Minor and adventive in E. N. Amer.; a low evergreen shrub blooming profusely in late summer.—Closely allied to Erica but differing in its deeply 4-parted colored calyx being longer than and concealing the corolla, subtended by 4 green bracts resembling a calyx: fr. a septicidally dehiscent few-seeded caps. (*Calluna*: from Greek *to sweep*; the branches are sometimes used for making brooms.)

*C. vulgaris*, Salisb. (*Erica vulgaris*, L.). From 6 in. to 3 ft. high: lvs. imbricated in 4 rows, about  $\frac{3}{4}$  in. long, sagittate at base, glabrous or pubescent: fls. pink, about  $\frac{1}{8}$  in. long, in slender erect one-sided racemes.—There are numerous named vars., comprising forms with white fls. and in shades of pink to deep carmine or double-fl'd., of dwarf and prostrate or very tall habit, with branches and lvs. pubescent or lvs. silvery or golden. Var. *Alporti*, Kirchn., is of tall vigorous growth with rosy carmine fls. Var. *alba Hammondi*, Hort., has white fls. Var. *Searlei*, Hort., has white fls. appearing late in autumn.

3. *PERNETTIA*, Gaud. About 25 species of evergreen shrubs native from Mex. to antarctic S. Amer. and 1 species in Tasmania and New Zeal.—Lvs. alternate, small, serrate: fls. usually solitary, axillary, on slender nodding pedicels; calyx free from ovary, 5-parted, scarcely enlarged at maturity; corolla urceolate, with short 5-lobed limb; stamens 10, the anthers 4-awned at apex: fr. a glabrous 5-celled many-seeded berry. (*Pernet-tia*: after A. J. Pernetty, 1716-1801, who accompanied Bougainville on his voyage around the world; usually but not originally spelled *Pernettya*.)

*P. mucronata*, Gaud. Much-branched shrub to 2 ft. or more high, the branches glabrous or slightly hairy: lvs. ovate to ovate-oblong,  $\frac{1}{8}$ - $\frac{3}{4}$  in. long, short-petioled, serrate and spiny-pointed, glabrous: fls. solitary, blooming May-June, globose-ovoid, about  $\frac{1}{4}$  in. long, long-pedicelled, white or tinged with pink: berry globose,  $\frac{1}{8}$ - $\frac{1}{2}$  in. across, from white to red or dark purple, remaining on branches over winter. Magellan region to Chile.—There are several named vars. differing mostly in color of berries and one form with narrower lvs.

4. *ARBUTUS*, L. Over 20 species of evergreen trees or shrubs native in Medit. region, Canary Is., and W. N. Amer., a few planted for ornament in warm regions.—Bark of sts. and branches smooth, red, peeling off in thin plates: lvs. alternate, petioled, entire or serrate: fls. in terminal panicles, the pedicels bracted; calyx free, 5-parted, persistent; corolla globular or urceolate, 5-toothed, deciduous; stamens 10, included, anthers with pair of reflexed awns on back; ovary 5- or rarely 4-celled with numerous ovules in each cell: fr. a globose berry, mostly granulose outside. (*Ar-butus*: ancient Latin name.)—

*A. Menziesii*, Pursh, Madrona, native in W. N. Amer., is sometimes transferred; it is a tall tree to 100 ft. high with oval or oblong usually entire lvs. glaucous beneath, white fls. in erect panicles 5-6 in. long, and bright orange-red berries.

*A. Unedo*, L. STRAWBERRY-TREE. To 30 ft. or more high, but in cult. usually 15 ft. or less: lvs. oblong to oblong-lanceolate, 2-4 in. long, tapering at both ends, serrate, dark shining green: fls. white or rosy, about  $\frac{1}{4}$  in. long, in short nodding panicles in autumn: berry scarlet, warty,  $\frac{3}{4}$  in. across. (*Unedo*: ancient classical name.) S. Eu., Ireland.

5. *ARCTOSTAPHYLOS*, Adans. About 40 species have been described from W. N. Amer. and 1 circumpolar in the northern hemisphere; evergreen

shrubs or small trees, the following often planted for ground-cover.—Closely related to *Arbutus* and differing chiefly in the ovules being solitary in the 4–10 cells of the ovary: fr. a mealy berry or drupe with 4–10 coherent nutlets. (*Arctostaphylos*: Greek for *bear* and *grape*.)

**A. Uva-ursi**, Spreng. BEAR-BERRY. Trailing or creeping shrub: lvs. obovate-oblong,  $\frac{1}{2}$ –1 in. long, tapering to base, obtuse, entire: fls. white tinged with red, about  $\frac{1}{16}$  in. long, in terminal clusters from May–June: drupe red,  $\frac{1}{4}$ – $\frac{1}{3}$  in. diam. (*Uva-ursi*: Latin for *grape* and *bear*.) Cool regions of northern hemisphere.

**6. EPIGÆA**, L. Two species of prostrate evergreen branching shrubs native in E. N. Amer. and Japan, one sometimes planted.—Lvs. alternate, petioled, entire: fls. sometimes dioecious, sessile in the axil of green bracts as long as calyx, clustered at ends of branches, fragrant; sepals 5, green; corolla salverform, 5-lobed; stamens 10, attached to base of corolla-tube, the anthers dehiscent longitudinally by slits; ovary hirsute, 5-celled with numerous ovules in each cell: fr. a loculicidally dehiscent caps. (*Epigæa*: Greek for *upon earth*, referring to the trailing growth.)

**E. repens**, L. TRAILING ARBUTUS. MAYFLOWER. Spreading on ground in patches to 2 ft. diam.: sts. hirsute, rooting: lvs. oval to orbicular, 1–3 in. long, obtuse or broadly acute, cordate or rounded at base, sparingly hirsute: fls. pink or white,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, blooming from Mar. to May. Acid soils, E. N. Amer.

**7. OXYDENDRUM**, DC. One deciduous tree in E. N. Amer., sometimes planted for ornament.—Lvs. alternate, petioled, serrate: fls. in terminal panicles composed of 6 or more one-sided racemes, the pedicels with 2 deciduous bractlets; sepals 5, persistent; corolla cylindric-ovoid with 5 minute lobes, puberulous; stamens 10, the anthers opening by chinks from apex to middle; ovary 5-celled with numerous ovules in each cell: fr. a loculicidally dehiscent caps. (*Oxydendrum*: Greek for *sour tree*, from the acid taste of the foliage.)

**O. arboreum**, DC. SOUR-WOOD. SORREL-TREE. Tree to 60 ft. high, with deeply fissured bark: lvs. oblong-lanceolate, 4–7 in. long, acuminate, slender-petioled, glabrous except few hairs on midrib, turning scarlet in autumn: fls. white,  $\frac{1}{2}$  in. long, in panicles 7–8 in. long in July–Aug.: caps. ovoid-pyramidal,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, grayish. Pa. to Ind., south to Fla. and La.

**8. KALMIA**, L. AMERICAN LAUREL. Evergreen or rarely deciduous shrubs furnishing a few ornamental subjects; about 7 species in N. Amer. and Cuba.—Lvs. alternate, opposite or in whorls of 3, entire: fls. in terminal or lateral corymbs or umbels, rarely solitary; calyx 5-parted; corolla broadly campanulate or somewhat salverform, 5-lobed, the tube with 10 pouches in which the anthers are held back and when touched spring up suddenly and discharge the pollen; stamens 10; ovary 5-celled with numerous ovules in each cell: fr. a septicidally dehiscent caps. (*Kalmia*: after Peter Kalm, 1715–1799, Swedish botanist who traveled in N. Amer.)

Corymbs terminal: lvs. usually alternate, acute.....1. *K. latifolia*  
Corymbs lateral: lvs. opposite or in 3's, obtuse.....2. *K. angustifolia*

**1. K. latifolia**, L. MOUNTAIN LAUREL. CALICO-BUSH. Dense round-topped shrub to 10 ft. high or rarely a tree to 30 ft.: lvs. alternate or irregularly whorled, oval to oblong or elliptic-lanceolate, 2–5 in. long, acute at both ends, glabrous, dark green above, yellowish-green below: fls. rose-colored to white, with purple markings within, about  $\frac{3}{4}$  in. across, in large terminal compound corymbs in May and June. E. N. Amer.—Var. *myrtifolia*, Bosse, is a dwarf form with lvs. 1–2 in. long. There are white-fl. vars. and one in which the corolla is deeply cut.

**2. K. angustifolia**, L. SHEEP LAUREL. LAMBKILL. From 6 in. to 3 ft. high: lvs. mostly opposite or in whorls of 3, oblong or oblong-lanceolate, 1–2½ in. long, obtuse, glabrous, bright green above, pale beneath: fls. purple or crimson,  $\frac{1}{4}$ – $\frac{1}{2}$  in. across, in simple or compound lateral corymbs in June–July, the leafy shoot produced beyond infl. E. N. Amer.—There are forms with white fls., with ovate lvs. and of dwarf habit.



9. **DABOECIA**, Don. One low evergreen shrub native from N. Spain to Ireland, suitable for rockeries or borders.—Lvs. alternate, entire: fls. in long terminal racemes, drooping, short-pedicelled; calyx 4-parted; corolla ovoid, shortly 4-lobed; stamens 8, included, the anthers longer than filaments; ovary 4-celled with numerous ovules in each cell: fr. a septically dehiscent caps. (Daboecia: from its Irish name, St. Dabeoc's heath.)

**D. cantabrica**, Koch (*D. polifolia*, Don. *Menziesia polifolia*, Juss. *Borella cantabrica*, Kuntze). To 2 ft. high, the branches glandular-pubescent: lvs. elliptic,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, revolute at margins, dark green and shining above, white-tomentose beneath: fls. purple,  $\frac{1}{8}$ – $\frac{1}{2}$  in. long, blooming from June–Oct.—Runs into several vars. with white, pink, dark purple, and white- and purple-striped fls., and a dwarf form with small narrow lvs.

10. **ENKIANTHUS**, Lour. Deciduous or evergreen shrubs with whorled branches, of about 10 species in China, Japan, and the Himalayas, a few planted for ornament.—Lvs. alternate, petioled, serrulate or entire, crowded toward end of branchlets: fls. in terminal drooping umbels or racemes; calyx with 5 small lobes; corolla campanulate or urceolate, shortly 5-lobed; stamens 10, the anthers opening by short slits, 2-awned at apex; ovary 5-celled with few ovules in each cell: fr. a loculicidally dehiscent caps., the 1 to few seeds winged or angled. (Enkianthus: Greek for *enlarged* and *flower*, referring to the colored involucre of one species.)

Fls. campanulate, yellow veined with red.....1. *E. campanulatus*  
Fls. urceolate, white.....2. *E. perulatus*

1. **E. campanulatus**, Nichols. Deciduous shrub to 6 ft. or sometimes 30 ft. high: lvs. elliptic, 1–3 in. long, acute or acuminate, serrulate, glabrous except on veins, turning scarlet in autumn: fls. campanulate, yellow or pale orange veined with dark red,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, slender-pedicelled, in 8–15-fl. puberulous racemes in May: caps. ovoid, about  $\frac{1}{4}$  in. long, on drooping pedicels turned upward toward apex. Japan.

2. **E. perulatus**, Schneid. (*E. japonicus*, Hook. f.). Deciduous shrub to 6 ft. high: lvs. obovate to elliptic-ovate, 1–2 in. long, acute, serrulate, pubescent on veins below, turning yellow and scarlet in autumn: fls. urceolate, white, on slender glabrous pedicels in drooping umbels, in May, the corolla with 5 swellings or sacs at base: caps. oblong-ovoid, about  $\frac{1}{2}$  in. long, on straight pedicels. Japan.

11. **RHODODENDRON**, L. **ROSE BAY**. Evergreen and deciduous shrubs or rarely trees, furnishing many highly ornamental subjects; about 350 species in the cool and temp. regions of the northern hemisphere and one extending to N. Australia.—Lvs. alternate, short-petioled, entire: fls. in terminal umbel-like racemes, rarely axillary or solitary; calyx 5-lobed or -parted, often minute; corolla rotate, campanulate or funnelform, 5-lobed or often 2-lipped; stamens usually 5 or 10, sometimes more, long-exserted or included, the anthers awnless, dorsifixed; ovary 5–20-celled with numerous ovules in each cell, the slender style with capitate stigma: fr. a caps. septically dehiscent from top by 5–20 valves. (Rhododendron: Greek for *rose-tree*.)—Any of the native species are likely to be transferred to gardens, but only those actually in the trade can be inserted here, or those which have played an important part in the origin of garden hybrids. It has seemed best to key the azaleas separately from the true rhododendrons, as they are distinct to gardeners; but the botanical characters distinguishing Azalea are not constant; some of the azaleas are evergreen, and some of the rhododendrons are deciduous.

A. Foliage evergreen (not including the evergreen azaleas, Nos. 9, 11, 12, 22): corolla campanulate: true rhododendrons.

B. Lvs. and ovary lepidote (having small scurfy scales).

C. Length of lvs.  $\frac{3}{4}$ – $1\frac{1}{2}$  in.: stamens exserted.....1. *R. micranthum*

CC. Length of lvs.  $1\frac{1}{2}$ –4 in.: stamens shorter than corolla.

D. Tube of fl. pubescent within: fls.  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam.....2. *R. arbutifolium*

- DD. Tube of fl. glabrous within: fls. 1-1½ in. diam.  
 E. Under side of lvs. rusty-lepidote: corolla-tube shorter or as long as lobes. . . . . 3. *R. carolinianum*  
 EE. Under side of lvs. glandular-lepidote: corolla-tube longer than lobes. . . . . 4. *R. minus*  
 BB. Lvs. and ovary glabrous or tomentose but not lepidote.  
 C. Under side of lvs. tomentose. . . . . 5. *R. arboreum*  
 CC. Under side of lvs. glabrous or only pubescent when young.  
 D. Ovary glabrous. . . . . 6. *R. ponticum*  
 DD. Ovary rusty-tomentose.  
 E. Both ends of lvs. acute. . . . . 7. *R. maximum*  
 EE. Both ends of lvs. usually obtuse. . . . . 8. *R. catawbiense*  
 AA. Foliage usually deciduous (see A, above): corolla commonly funnel-form: Azaleas.  
 B. Stamens usually 10.  
 C. Under side of lvs. pubescent: fls. mostly pure white. . . . . 9. *R. mucronatum*  
 CC. Under side of lvs. glabrous except on veins: fls. pale rose spotted with brown. . . . . 10. *R. Schlippenbachii*  
 BB. Stamens 5-7.  
 C. Fls. usually solitary. . . . . 11. *R. indicum*  
 CC. Fls. in clusters of 2 or more.  
 D. Lvs. linear-lanceolate. . . . . 12. *R. linearifolium*  
 DD. Lvs. oblong to ovate.  
 E. Diam. of fls. ½ in. . . . . 13. *R. Tschonoskii*  
 EE. Diam. of fls. 1½-2½ in.  
 F. Tube of corolla long and narrow, as long as or longer than lobes.  
 G. Blooming before the lvs.  
 H. Color of fls. pink to white. . . . . 14. *R. nudiflorum*  
 HH. Color of fls. yellow. . . . . 15. *R. luteum*  
 GG. Blooming with or after the lvs.  
 H. Color of fls. orange to scarlet. . . . . 16. *R. calendulaceum*  
 HH. Color of fls. white or pink.  
 I. Upper lobe of corolla with conspicuous yellow blotch. . . . . 17. *R. occidentale*  
 II. Upper lobe of corolla without yellow blotch. . . . . 18. *R. viscosum*  
 FF. Tube of corolla much shorter than lobes.  
 G. Color of fls. yellow. . . . . 19. *R. molle*  
 GG. Color of fls. red, pink, or white.  
 H. Corolla rotate-campanulate, somewhat 2-lipped. . . . . 20. *R. Vaseyi*  
 HH. Corolla funnellform or campanulate-funnelform.  
 I. Outside of corolla pubescent. . . . . 21. *R. japonicum*  
 II. Outside of corolla glabrous. . . . . 22. *R. obtusum*

1. *R. micranthum*, Turcz. Evergreen densely-branched shrub to 8 ft. high: lvs. lanceolate or oblanceolate, ¾-1½ in. long, obtuse or acutish, glabrous above, densely ferruginous-lepidote beneath: fls. white, ½-½ in. across, in dense many-fld. clusters in June-July, campanulate, the oblong or oval lobes longer than tube, lepidote outside; stamens glabrous, longer than corolla. Manchuria to W. and Cent. China.

2. *R. arbutifolium*, Hort. (*R. ferrugineum* × *R. minus*. *R. Wilsonii*, Hort., not Nutt.). Evergreen shrub to 4 ft. high: lvs. elliptic to elliptic-lanceolate, 1½-3 in. long, acute at both ends, densely lepidote beneath: fls. pink, ½-¾ in. across, in many-fld. clusters in June-July; corolla-tube about twice as long as lobes and pubescent within; stamens and style shorter than corolla, the filaments hairy below middle. Garden origin.

3. *R. carolinianum*, Rehd. (*R. punctatum*, Small, not Andr.). Compact evergreen shrub to 6 ft. high: lvs. oval to narrow-elliptic, 2-3 in. long, acutish, cuneate at base, densely rusty-lepidote beneath: fls. pale rosy-purple or rarely whitish, not or only slightly spotted, about 1½ in. across, in dense 5-10-fld. clusters in May-June; corolla-tube gradually widened, shorter or as long as lobes, glabrous or nearly so within; stamens mainly shorter than corolla. N. C.

4. *R. minus*, Michx. (*R. punctatum*, Andr.). Evergreen shrub to 10 ft. high: lvs. elliptic to elliptic-lanceolate, 1½-4 in. long, acute at both ends, glandular-lepidote beneath: fls. pink, the upper lobe spotted with greenish, about 1 in. across, in 6-8-fld. clusters in June-July; corolla-tube longer than lobes, lepidote outside; stamens shorter than corolla. N. C. to Ga. and Ala.

5. *R. arboreum*, Sm. Evergreen shrub or small tree to 40 ft. high: lvs. oblong to lanceolate, 4-7 in. long, tapering at both ends, white- or rusty-tomentose beneath: fls. blood-red, pink or white, usually spotted, 1-1½ in. across, in dense clusters from Mar.-May; corolla campanulate, the tube much longer than lobes; stamens shorter than corolla; ovary rusty-pubescent. Himalayas.—There are

several Latin-named vars. differing chiefly in color of fls. and color of tomentum on under side of lvs. Some of the hardy hybrids have *R. arboreum* as one parent.

6. *R. ponticum*, L. Evergreen shrub 10 ft. or more high: lvs. elliptic to oblong, 2-6 in. long, acute, pale beneath, glabrous: fls. purple, spotted brownish within, about 2 in. across, in many-fl'd. clusters in May-June; corolla funnelform-campanulate; ovary glandular. Spain, Portugal, Asia Minor.—There is a white-fl'd. var. and also forms with variegated and purplish lvs. This species has entered into the "catawbiense hybrids."

7. *R. maximum*, L. GREAT LAUREL. Evergreen shrub or small tree to 35 ft. high: lvs. lanceolate-oblong, 4-10 in. long, acute at both ends, whitish beneath, glabrous: fls. rose-colored spotted within with greenish, about 1½ in. across, in many-fl'd. clusters in June-July; corolla campanulate, deeply lobed; stamens and style usually included; ovary rusty-tomentose. N. S. to Ga. and Ala.—There are forms with white, purple, and pink fls. Parent, with *R. catawbiense*, of many hardy hybrids.

8. *R. catawbiense*, Michx. MOUNTAIN ROSE BAY. Evergreen shrub to 20 ft. high: lvs. oval or oblong, 3-5 in. long, usually rounded or obtuse at both ends, mucronulate, pale beneath: fls. lilac-purple, 2-2½ in. across, in many-fl'd. clusters in June; corolla broadly campanulate; stamens mostly included; ovary rusty-tomentose. (Catawbiense: native of the Catawba region in N. C.) Mts. Va. to Ga.—One of the most extensive groups of garden hybrids has this species as one parent, the others being *R. maximum*, *R. ponticum*, *R. caucasicum*, *R. arboreum*, and perhaps others. The fls. vary in color from white to dark red. *R. Everestianum* is an example of this group. There are many forms named in Latin and English.

9. *R. mucronatum*, Don (*R. ledifolium*, Don. *Azalea ledifolia*, Hook.). Evergreen wide-spreading shrub from 1-6 ft. high, the branches, lvs. and pedicels densely clothed with gray or rusty hairs: lvs. elliptic or elliptic-lanceolate, 1-3 in. long, obtuse or rounded, mucronate, both surfaces pubescent: fls. white or sometimes rosy, fragrant, 2-2½ in. across, in 1-3-fl'd. clusters in May; corolla wide-funnelform; stamens usually 10, about length of corolla. China.—There are several Latin-named vars. having white, purple, or double fls. A large number of beautiful hybrids are the offspring of this species and *R. indicum*.

10. *R. Schlippenbachii*, Maxim. (*Azalea Schlippenbachii*, Kuntze). Deciduous shrub from 3-15 ft. high, with glandular-pilose branchlets: lvs. broadly obovate, 2-5 in. long, rounded and mucronate at apex, becoming glabrous beneath except on veins: fls. pale rose, the posterior lobes marked with brown, fragrant, 2-3 in. across, in 3-6-fl'd. clusters in May, the corolla-lobes longer than tube; stamens 10, of unequal length. (Named for Baron A. Schlippenbach, who collected it in 1854.) Manchuria, Japan.

11. *R. indicum*, Sweet (*Azalea indica*, L.). Much-branched evergreen shrub to 6 ft. high, the young branches clothed with rusty hairs: lvs. elliptic to lanceolate-oblong, 1-3 in. long, obtuse or acute, pale beneath, with bristly hairs on both surfaces: fls. red to pink, 2-3 in. across, usually solitary, blooming June-July; corolla broad-funnelform; stamens 5, as long or longer than corolla, anthers purple. Japan.—Var. *balsaminæflorum*, Nichols. (var. *rosiflorum*, Rehd. *Azalea balsaminæflora*, Carr.), is a dwarf var. with salmon-red double fls. With *R. mucronatum* and *R. Simsii*, this species is the parent of most of the hybrid Indian azaleas.

12. *R. linearifolium*, Sieb. & Zucc. (*Azalea linearifolia*, Hook. f.). Evergreen shrub to 4 ft. high, the young parts covered with bristly hairs: lvs. linear-lanceolate, 2-3 in. long, tapering at each end: fls. rosy-lilac, in clusters of about 3 in May; corolla deeply divided into linear-lanceolate segms.; stamens 5. Japan.

13. *R. Tschonoskii*, Maxim. (*Azalea Tschonoskii*, Kuntze). Densely branched deciduous shrub to 8 ft. or less high, with young branchlets pubescent: lvs. narrow to broadly lanceolate, ¼-½ in. long, pubescent on both surfaces, turning shades of orange and crimson in autumn: fls. white, ¼-½ in. across, in 4-6-fl'd. clusters; stamens 5, exserted. Korea, Japan, where it was collected by Tschonoski.

14. *R. nudiflorum*, Torr. (*Azalea nudiflora*, L.). PINXTER-FLOWER. Deciduous shrub to 6 or rarely 9 ft. high, the branchlets pubescent: lvs. oblong or obovate, 2-3 in. long, bristly on midrib beneath: fls. pink to nearly white, about 1½ in. across, in 6-12-fl'd. clusters in Apr. or May before the lvs.; corolla funnelform, the tube as long or longer than lobes, pubescent outside; stamens 5, exceeding the corolla. Mass. to Fla. and Tex.

15. *R. luteum*, Sweet (*R. flavum*, Don. *Azalea pontica*, L.). Deciduous densely-branched shrub 6-12 ft. high: lvs. oblong-lanceolate, 2-5 in. long, acute or

obtuse, tapering at base, hairy on both sides when young: fls. yellow, very fragrant, about 2 in. across, in 10-12-fl. clusters in May before the lvs.; corolla-tube long and cylindrical, hairy; stamens 5, long-exserted. Caucasus.—The principal parent (with perhaps *R. viscosum* and *R. arborescens*) of the Ghent azaleas, *R. gandavense*, Rehd., which has as the other parent *R. Mortieri*, Sweet, itself a hybrid between *R. calendulaceum*, *R. nudiflorum* and with some infusion of *R. speciosum*.

16. *R. calendulaceum*, Torr. (*Azalea calendulacea*, Michx.). FLAME-COLORED AZALEA. Deciduous shrub to 10 ft. or more high: lvs. elliptic to obovate-oblong, 2-3 in. long, acute, broadly cuneate at base, pubescent: fls. orange-yellow to scarlet with an orange blotch on upper lobe, about 2 in. across, in 5-7-fl. clusters in May and June with or shortly after lvs.; corolla funnelform, the tube cylindrical, pubescent outside; stamens 5, long-exserted. Pa. to N. Ga.—There is a yellow-fl. var.

17. *R. occidentale*, Gray (*Azalea occidentalis*, Torr. & Gray. *A. californica*, Torr. & Gray). Deciduous shrub to 9 ft. high: lvs. elliptic to oblong-lanceolate, 1-3 in. long, acute or obtusish, ciliate, thinly pubescent on both surfaces when young: fls. white or pink with yellow blotch on upper lobe, fragrant, to 2½ in. across, in 6-12-fl. clusters in June-July with or after lvs., rarely before lvs.; corolla-tube pubescent; stamens 5, exserted. S. Ore. to S. Calif.

18. *R. viscosum*, Torr. (*Azalea viscosa*, L.). WHITE SWAMP HONEYSUCKLE. Deciduous shrub to 9 ft. or more high: lvs. elliptic-obovate to oblong-lanceolate, 1-2 in. long, acute or mucronulate, ciliate, bristly on midrib beneath: fls. white or tinged rose, fragrant, 1½-2 in. long, in 4-9-fl. clusters from May-July after the lvs.; corolla cylindrical, glandular-hairy outside; stamens 5, exserted. E. N. Amer.

19. *R. molle*, Don (*R. sinense*, Sweet. *Azalea sinensis*, Lodd. *A. mollis*, Blume). Deciduous shrub 3-5 ft. high: lvs. oblong to oblong-lanceolate, 2-6 in. long, obtuse and mucronate, ciliate, soft-pubescent beneath: fls. golden-yellow, 2 in. across, in many-fl. clusters in Apr.-May before the lvs.; corolla campanulate-funnelform; stamens 5, as long or longer than corolla. China.—A group of garden hybrids between this species and *R. japonicum* is known as *R. Kosterianum*, Schneid., Anthony Koster & Sons of Holland being the first to cross the two species.

20. *R. Vaseyi*, Gray (*Azalea Vaseyi*, Rehd. *Biltia Vaseyi*, Small). Deciduous shrub to 15 ft. high: lvs. elliptic or elliptic-oblong, 2-5 in. long, acuminate, ciliate, glabrous or slightly hairy on midrib: fls. pale rose-colored, spotted with orange or red-brown at base of upper lobes, 1½ in. across, in 5-8-fl. clusters in May before lvs.; corolla rotate-campanulate, slightly 2-lipped, the tube very short, glabrous; stamens usually 7, unequal, the longer ones exserted. (Named after Geo. R. Vasey, died 1893, botanist U. S. Dept. of Agr.) N. C.

21. *R. japonicum*, Suringar (*R. molle*, Miq. *Azalea japonica*, Gray. *A. mollis*, André). Deciduous shrub to 6 ft. high: lvs. obovate to oblanceolate, 2-4 in. long, obtuse and mucronate, ciliate, glabrous except appressed bristles on veins and sparingly on upper surface: fls. orange-red to scarlet, 2-2½ in. across, in 6-12-fl. clusters from Apr.-June before the lvs.; corolla campanulate-funnelform, pubescent outside; stamens 5, shorter than corolla. Japan.

22. *R. obtusum*, Planch. (*R. indicum* var. *obtusum*, Maxim. *Azalea obtusa*, Lindl.). Evergreen much-branched shrub to 3 ft. high: lvs. dimorphic, the mature ones obovate, ½-1½ in. long, rounded and mucronate, the spring lvs. elliptic-lanceolate, acute: fls. scarlet, slightly fragrant, 1-1½ in. across, in 2-3-fl. clusters in Apr.-May; corolla funnelform, glabrous outside; stamens 5, included or exserted, anthers yellow. Japan.—Var. *amœnum*, Rehd. (*R. amœnum*, Planch. *Azalea amana*, Lindl.). Corolla usually double (hose-in-hose), purple, ½-1 in. across. There are many forms of this var. having white to deep crimson fls. It is one of the "Kurume" azaleas, a group originating near the city of Kurume in Japan, the commonest named form probably being *Hinodigiri* with brilliant crimson fls. Var. *Kämpferi*, Wils. (*R. Kämpferi*, Planch. *R. indicum* var. *Kämpferi*, Maxim.). Lvs. deciduous or evergreen: fls. red, but there is a white-fl. form and also one with double fls., 1½-2 in. across. (Named for E. Kämpfer, 1651-1716, German naturalist.)

12. ZENOBIA, Don. One deciduous or half-evergreen shrub in E. N. Amer. (or by some authors separated into 2 species), planted out-of-doors or forced in the greenhouse.—Lvs. alternate, short-petioled, entire or crenulate: fls. long-pedicelled, bracted at base, in axillary clusters forming terminal racemes on the upper part of branches of the previous year; calyx with 5 short



lobes; corolla campanulate, obtusely 5-lobed; stamens 10, the anthers with 4 slender awns; ovary 5-celled with numerous ovules in each cell: fr. a loculicidally dehiscent caps., the dorsal sutures somewhat thickened. (Zeno-bia: after Zenobia, queen of Palmyra, who lived in the 3rd century.)

**Z. pulverulenta**, Pollard (*Z. speciosa*, Don. *Andromeda pulverulenta*, Bartram. *A. speciosa*, Michx.). To 6 ft. high, the branches upright or arching, glabrous: lvs. oval to oblong, 1-2 in. long, obtuse or acutish, tapering at base, crenulate, often covered with glaucous bloom: fls. white,  $\frac{1}{3}$ - $\frac{1}{2}$  in. across, nodding: caps. depressed-globose, about  $\frac{1}{4}$  in. across. N. C. to Fla.—In var. **nuda**, Rehd. (*Z. cassinifolia*, Pollard. *Andromeda cassinifolia*, Vent.), the lvs. are green and without bloom.

**13. LEUCOTHOË**, Don. About 35 species of evergreen or deciduous shrubs native in N. and S. Amer., Madagascar, Himalayas, and Japan.—Lvs. alternate, petioled, serrate: fls. in axillary or terminal racemes, bracted; sepals 5, imbricated; corolla ovoid, urceolate or cylindrical, with 5 imbricated teeth; stamens 10, the anthers obtuse or awned; ovary 5-celled with numerous ovules in each cell: fr. a loculicidally dehiscent caps., the sutures not thickened. (Leucoth-oë: named for the daughter of Orchamus, king of Babylonia.)

Lvs. long-acuminate, conspicuously petioled.....1. *L. Catesbæi*  
Lvs. abruptly acuminate, very short-petioled.....2. *L. axillaris*

**1. L. Catesbæi**, Gray (*Andromeda Catesbæi*, Walt.). Evergreen shrub to 6 ft. high, with slender glabrous arching branches: lvs. ovate-lanceolate to lanceolate, 3-7 in. long, on petioles  $\frac{1}{2}$  in. or more long, long-acuminate, glossy green above and paler beneath: fls. white, reddish in bud, about  $\frac{1}{4}$  in. long, in axillary racemes 1-2 in. long in Apr. and May; sepals ovate-oblong, acute. (Named for Mark Catesby, 1679-1749, English naturalist.) Va. to Ga.

**2. L. axillaris**, Don (*Andromeda axillaris*, Lam.). Very similar to the above but differing in its oval to oblong-lanceolate abruptly acuminate lvs. with petioles  $\frac{1}{4}$  in. or less long, the fls. being greenish in bud, and the ovate sepals. Va. to Fla. and Ala.

**14. PIERIS**, Don. Evergreen and deciduous shrubs or rarely small trees, sometimes planted for ornament, of about 10 species in N. Amer. and E. Asia south to Himalayas.—Lvs. alternate, short-petioled, entire or serrulate: fls. short-pedicelled, bracted, in terminal often paniced racemes or axillary clusters; calyx 5-lobed, valvate or distinct; corolla ovoid or urceolate, with 5 short recurved lobes; stamens 10, filaments 2-toothed below apex or anthers with pair of awns near base; ovary 5-celled with numerous ovules in each cell: fr. a loculicidally dehiscent caps. with the sutures often thickened. (Pie-ris: mythological name.)

Fls. in terminal panicles: lvs. serrulate.

Panicles upright: branches and petioles with strigose hairs.....1. *P. floribunda*

Panicles drooping: branches and petioles glabrous.....2. *P. japonica*

Fls. in axillary clusters, forming terminal leafy racemes: lvs. entire.....3. *P. lucida*

**1. P. floribunda**, Benth. (*Andromeda floribunda*, Pursh). Dense evergreen shrub to 6 ft. high, the branches and petioles with strigose brown hairs: lvs. ovate to oblong-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, acute, serrulate and setosely ciliate, otherwise glabrous: fls. white,  $\frac{1}{4}$  in. long, on slender racemes forming a dense terminal upright panicle 2-5 in. long in Apr. and May; corolla ovate, strongly 5-angled. Va. to Ga.

**2. P. japonica**, D. Don (*Andromeda japonica*, Thunb.). Evergreen shrub or sometimes small tree to 30 ft. high, the branches and petioles glabrous: lvs. obovate-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, acute, serrulate, glabrous: fls. white,  $\frac{1}{4}$  in. long, on slender racemes forming a terminal drooping panicle 3-6 in. long in Apr. and May; corolla ovate, not angled. Japan.—There is a dwarf form and also one in which the lvs. are margined with white.

**3. P. lucida**, Rehd. (*P. nitida*, Benth. & Hook. *Andromeda nitida*, Bartram. *A. coriacea*, Ait. *Neopieris nitida*, Britt.). FETER-BUSH. Evergreen shrub to 6 ft. high with smooth triangular branches: lvs. broadly elliptic to oblong,  $1\frac{1}{2}$ -3 in. long, tapering at both ends, entire, the margins slightly revolute, glabrous: fls. white to pink,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, in small axillary clusters forming a terminal leafy raceme from Mar.-May. N. C. to Fla. and La.—There is a form with deep pink fls.

15. **VACCINIUM**, L. About 130 species of erect or creeping shrubs of wide geographical distribution in the northern hemisphere, several grown for their edible fr. or for ornament.—Lvs. alternate, deciduous or evergreen: fls. in axillary or terminal racemes or solitary; calyx with 4-5 short lobes; corolla urceolate, cylindrical, campanulate or rotate, 4-5-lobed; stamens 8-10, the anthers sometimes 2-awned on back; ovary inferior, 4-5-celled or rarely 8-10-celled by intrusion of midrib of each carpel, with few or many ovules in each cell: fr. a berry capped by the persistent calyx. (*Vaccinium*: ancient Latin name of the blueberry.)—*V. Vitis-Idæa*, L., the Mountain Cranberry, is gathered from the wild extensively in N. Canada for cooking purposes. It is a creeping evergreen shrub with small obovate or oval lvs., white or rose-colored 4-parted fls. and dark red berries.

Fls. cylindrical; anthers included.

Plant 4-15 ft. high, the lvs. large.....1. *V. corymbosum*

Plant 2 ft. or less high, the lvs. small.....2. *V. pennsylvanicum*

Fls. campanulate or rotate; anthers exserted.

Corolla 5-lobed.....3. *V. stamineum*

Corolla deeply 4-parted, the lobes reflexed.

Lvs. ovate, acute: fls. terminal.....4. *V. Oxycoccus*

Lvs. oblong, obtuse: fls. lateral.....5. *V. macrocarpon*

1. *V. corymbosum*, L. HIGH-BUSH or SWAMP BLUEBERRY. Bushy shrub 4-15 ft. high, with yellowish-green warty branches: lvs. oval to oblong,  $1\frac{1}{2}$ -3 in. long, acutish, entire or serrulate, glabrous or slightly pubescent beneath: fls. in short racemes appearing with lvs., white or pinkish, long-cylindrical,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long: berry blue-black with a bloom, about  $\frac{1}{4}$  in. diam. N. E. N. Amer.

2. *V. pennsylvanicum*, Lam. (*V. angustifolium*, Ait.). LOW BLUEBERRY. Dwarf semi-prostrate shrub from 6 in. to 2 ft. high: lvs. oblong-lanceolate or oblong-elliptic,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, acute, serrulate and ciliate, glabrous except on midrib beneath: fls. in small clusters, short-pedicelled, greenish-white, short-cylindrical,  $\frac{1}{4}$  in. or less long: berry bluish-black with bloom, rarely white or reddish,  $\frac{1}{4}$ - $\frac{3}{8}$  in. diam. E. N. Amer.

3. *V. stamineum*, L. (*Polycodium stamineum*, Greene). DEERBERRY. SQUAW HUCKLEBERRY. Diffusely branched shrub 2-5 ft. high, with pubescent twigs: lvs. oval to obovate-oblong, 1-4 in. long, acute, entire, pale, glaucous and pubescent beneath: fls. numerous in leafy-bracted racemes, jointed with the slender pedicels, white or tinged purple, about  $\frac{1}{4}$  in. long, open-campanulate, 5-parted, the anthers and style much exserted: berry globose or pyriform, about  $\frac{1}{3}$  in. diam., green or yellow, inedible. E. N. Amer.

4. *V. Oxycoccus*, L. (*Oxycoccus Oxycoccus*, MacM.). SMALL or EUROPEAN CRANBERRY. Sts. slender, creeping, rooting at nodes, to 1 ft. long: lvs. evergreen, thick, ovate,  $\frac{1}{4}$  in. long, acute, the margins strongly revolute, dark green and glossy above, white-glaucous beneath: fls. in few-fl'd. terminal umbels, pink, the corolla deeply 4-parted and the lobes revolute, anthers exserted: berry globose,  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam. Cold swamps in Eu., Asia, and N. Amer.

5. *V. macrocarpon*, Ait. (*Oxycoccus macrocarpus*, Pursh). LARGE or AMERICAN CRANBERRY. Larger and stouter than preceding: lvs. oblong,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, obtuse, the margins less revolute: fls. in lateral clusters: berry oblong or subglobose,  $\frac{1}{8}$ - $\frac{3}{4}$  in. diam. N. E. N. Amer.

### 133. MYRSINACEÆ. MYRSINE FAMILY

More than 30 genera and 500 species widely distributed in the tropics and subtropics, one a popular greenhouse plant.—Lvs. alternate, simple, exstipulate, leathery: fls. bisexual or unisexual, regular, in axillary or terminal many-fl'd. panicles or umbels, often glandular; calyx 4-5-parted, usually persistent; corolla gamopetalous, rarely polypetalous, 4-5-lobed; stamens 5, opposite the corolla-lobes, free or somewhat united, inserted on corolla, alternating staminodia sometimes present; ovary superior in ours, 1-celled with few or numerous ovules, style and stigma 1: fr. a few-seeded drupe.

**ARDISIA**, Sw. Trees and shrubs native in hot and warm regions, of more than 200 species.—Lvs. entire or rarely dentate or crenate: fls. bisexual or

polygamo-diœcious; calyx usually 5-lobed; corolla rotate, 5-parted; stamens short, inserted on throat of corolla: fr. a globose drupe. (Ardis-ia: from Greek for *point*, referring to the stamens or corolla-lobes.)

**A. crispa**, A. DC. (*A. crenulata*, Lodd. *A. crenata*, Roxb.). Compact shrub in cult.: lvs. oblong-lanceolate, to 3 in. long, wavy-margined, dark green above, pale beneath: fls. red, fragrant, in terminal panicles: frs. coral-red, about  $\frac{1}{4}$  in. diam. Malaya and China.

### 134. PRIMULACEÆ. PRIMROSE FAMILY

Annual and perennial herbs, rarely shrubby, of nearly 30 genera and 700 species widely distributed but most abundant in the northern hemisphere; many are showy-fl. and grown in rockeries, flower-gardens and greenhouses.—Lvs. alternate, opposite or whorled, sometimes all basal, simple or lobed, exstipulate: fls. bisexual, regular, solitary or umbellate at end of a scape or in terminal or axillary racemes, panicles or spikes, or solitary in the axils; calyx usually 5-parted and persistent; corolla gamopetalous or rarely lacking, with long or short tube, usually 5-lobed; stamens 5, opposite corolla-lobes, epipetalous, sometimes staminodia present, the filaments distinct or united at base; ovary superior, rarely partly inferior, 1-celled with numerous ovules on a free central placenta, style and stigma 1: fr. a dehiscent caps. *D*, Fig. 12, page 570.

- Plant scapose, all lvs. radical.
  - Corolla-lobes upright or spreading.
    - Tube of corolla longer than calyx.....1. PRIMULA
    - Tube of corolla shorter than calyx.....2. ANDROSACE
  - Corolla-lobes reflexed.
    - Fls. single: root tuberous.....3. CYCLAMEN
    - Fls. umbellate: root not tuberous.....2. DODOCATHEON
- Plant with leafy sts.
  - Corolla funnelform or salverform.....2. ANDROSACE
  - Corolla rotate or campanulate.
    - Caps. dehiscent by 2–5 valves: stamens glabrous.....5. LYSIMACHIA
    - Caps. circumscissile: stamens usually pubescent.....6. ANAGALLIS

**1. PRIMULA, L. PRIMROSE.** More than 300 species of perennial scapose herbs in temp. regions of the northern hemisphere and a few in the southern hemisphere; many species are grown in borders and rockeries and several are amongst the most popular greenhouse and florists' plants.—Lvs. all basal, petioled or sessile, entire or lobed: fls. dimorphic, in umbels or heads or sometimes in involucrate superimposed whorls subtended by leafy or narrow involucral bracts; calyx tubular, campanulate or funnelform; corolla funnelform or salverform, exceeding the calyx, the lobes spreading or rarely erect, entire or 2-lobed; stamens inserted on tube or mouth of corolla, included, the filaments very short: caps. globose or cylindrical, dehiscent by 5–10 valves. (Prim-ula: diminutive of *primus*, first, referring to its early blooming.)

- A. Umbels superimposed (one above the other).
  - B. Color of fls. yellow.
    - c. Plant glandular-pubescent, not farinose.....1. *P. floribunda*
    - cc. Plant glabrous, slightly farinose.
      - d. Bracts lanceolate.....2. *P. verticillata*
      - dd. Bracts ovate.....3. *P. kewensis*
  - BB. Color of fls. not yellow.
    - c. Fls.  $\frac{1}{2}$ – $\frac{3}{4}$  in. or more across.
      - d. Lvs. orbicular, lobed.....8. *P. sinensis* var. *stellata*
      - dd. Lvs. obovate-oblong or oblanceolate, not lobed.
        - e. Scape glabrous.....4. *P. japonica*
        - ee. Scape silvery-farinose.....5. *P. pulverulenta*
    - cc. Fls.  $\frac{1}{2}$  in. or less across.
      - d. Petioles much longer than lf.-blades, the lobes incisedentate.....6. *P. malacoides*
      - dd. Petioles as long as or shorter than blades, the shallow lobes minutely serrulate.....7. *P. Forbesii*

- AA. Umbels single and terminal or sometimes fls. solitary.
- B. Lvs. cordate or subcordate at base.
    - C. Calyx inflated, truncate at base..... 8. *P. sinensis*
    - CC. Calyx not inflated, attenuate at base.
      - D. Teeth of calyx very small, much shorter than tube..... 9. *P. obconica*
      - DD. Teeth of calyx linear, about length of tube.
        - E. Fls.  $1\frac{1}{2}$ –2 in. across..... 10. *P. Sieboldii*
        - EE. Fls. 1 in. or less across..... 11. *P. cortusoides*
  - BB. Lvs. attenuate at base.
    - C. Scape evident; fls. several to many in an umbel.
      - D. Pedicels very short or almost lacking..... 12. *P. denticulata*
      - DD. Pedicels evident.
        - E. Calyx about  $\frac{1}{4}$  in. long, divided to middle..... 13. *P. Auricula*
        - EE. Calyx about  $\frac{1}{2}$  in. long, the tube much longer than lobes.
          - F. Fls. yellow.
            - G. Corolla with scale-like folds at the slightly contracted mouth: caps. one-half length of calyx..... 14. *P. veris*
            - GG. Corolla without folds, not contracted at mouth: caps. as long or longer than calyx..... 15. *P. elatior*
          - FF. Fls. of many colors, yellow or red and yellow, bronze, maroon, or white: a hybrid group, often having very long-pedicelled fls..... 16. *P. polyantha*
      - CC. Scape none and fl. solitary..... 17. *P. vulgaris*

1. *P. floribunda*, Wall. BUTTERCUP PRIMROSE. Glandular-pubescent plant from 5–8 in. high, grown in the greenhouse for its winter bloom: lvs. elliptic or ovate, about 3 in. long, acute or obtuse, narrowed into broad petiole, irregularly dentate: scape bearing 3–5 many-fl. superimposed umbels subtended by ovate or lanceolate lf.-like bracts; fls. golden-yellow, fragrant,  $\frac{1}{4}$ – $\frac{1}{2}$  in. across; calyx divided to about middle; corolla-tube about twice as long as calyx. Himalayas.

2. *P. verticillata*, Forsk. Glabrous slightly farinose herb to 2 ft. high, grown in the greenhouse: lvs. lanceolate or ovate-lanceolate, 4–8 in. long, acute or acuminate, narrowed into a short broad-winged petiole, irregularly serrate: scape bearing several many-fl. superimposed umbels subtended by lanceolate or linear-lanceolate bracts, farinose below the umbels; fls. yellow, fragrant,  $\frac{3}{4}$ –1 in. across; calyx deeply divided. S. Arabia.

3. *P. kewensis*, W. Wats. (*P. floribunda*  $\times$  *P. verticillata*). Glabrous sometimes farinose plant to 1 ft. or more high: lvs. obovate-spatulate, 6–8 in. long, narrowed into winged petiole, dentate and wavy margined: scape bearing 2–4 several-fl. superimposed umbels subtended by large ovate bracts; fls. bright yellow, fragrant, slender-pedicelled, about  $\frac{3}{4}$  in. across; calyx divided below middle; corolla-tube about twice as long as calyx.

4. *P. japonica*, Gray. Glabrous, only calyx farinose, 8 in. to 2 ft. high, grown out-of-doors and blooming in summer: lvs. obovate-oblong or spatulate, 4–6 in. long, obtuse, narrowed into a winged petiole with a sheathing base, irregularly dentate: scape much longer than lvs., bearing several many-fl. superimposed umbels subtended by linear-subulate bracts; fls. purple, rarely rose or white,  $\frac{1}{2}$  in. or more across; calyx farinose inside, the lobes broadly triangular and acuminate; corolla-tube about three times as long as calyx. Japan.—There are many color forms.

5. *P. pulverulenta*, Duthie. Plant to 3 ft. high, with silvery farinose scape and infl., planted out-of-doors: lvs. obovate or oblanceolate, 6 in. or more long, obtuse, narrowed into long winged petiole, irregularly dentate: scape bearing several superimposed umbels subtended by linear bracts; fls. purple with orange-brown eye, about 1 in. diam.; calyx-lobes lanceolate and acuminate. Mts. of W. China.

6. *P. malacoides*, Franch. FAIRY PRIMROSE. Popular greenhouse plant from 8–20 in. high, glabrous above, pubescent below with white hairs: lvs. ovate or oblong-ovate,  $1\frac{1}{2}$ –3 in. long, cordate at base, on petioles much exceeding the blades, sometimes 5–7 in. long, broadly 6–8-lobed, the lobes acutely incise-dentate, sparsely white-farinose beneath: scapes bearing 2–6 many-fl. superimposed umbels subtended by linear-lanceolate bracts which are white-farinose below; fls. rose and lilac, about  $\frac{1}{2}$  in. across; calyx densely white-farinose, the lobes spreading; corolla-tube slightly longer than calyx. China.—There are strains with white and double fls., and a round-fl. form (with little space between the segms.) has appeared.

7. *P. Forbesii*, Franch. BABY PRIMROSE. Smaller and less branched than the former, the cordate-ovate lvs. 1–2 in. long on petioles as long as or shorter than blades, slightly sinuate-lobed, the lobes denticulate, calyx not so farinose. (Named for Francis Blackwell Forbes, English botanist and co-author with W. B. Hemslay



of "An Enumeration of Chinese Plants.") China, Burma.—Most of the "baby primrose" in cult. is *P. malacoides*.

8. *P. sinensis*, Lindl. (*P. prænitens*; Ker. *P. chinensis*, Hort.). CHINESE PRIM-ROSE. Soft-hairy plant from 4–8 in. high, grown in the greenhouse for winter bloom: lvs. orbicular, 2–4 in. long, more or less cordate at base, the petioles longer than blades, several-lobed, the lobes unequally incise-dentate: scape bearing a many-fl'd. umbel subtended by leafy bracts; fls. white, pink, red, or purplish, about  $1\frac{1}{4}$  in. across, long-pedicelled, salverform; calyx inflated, truncate at base, about length of corolla-tube. China.—There are double-fl'd., crested and fringed forms. Var. *stellata*, Hort., is taller and more free-flowering than type: fls. in superimposed umbels.

9. *P. obconica*, Hance. Popular winter-blooming greenhouse plant to 1 ft. high, the soft hairs often poisonous and irritating: lvs. orbicular or oblong-ovate, 2–4 in. long, cordate at base, the petioles as long as or longer than blades, margins uneven, denticulate: scape bearing a many-fl'd. umbel subtended by linear unequal bracts; fls. lilac or pink,  $\frac{3}{4}$ –1 in. across, long-pedicelled; calyx with very small triangular teeth much shorter than tube, pubescent. China.—Runs into several shades of color, kinds with fls.  $1\frac{1}{2}$  in. diam., and vars. with fringed, crisped or double fls.

10. *P. Sieboldi*, Morr. Pubescent plant 4–8 in. high, grown out-of-doors and blooming in late spring: lvs. ovate-oblong, 2–4 in. long, cordate at base, the petioles longer than blades, with numerous small unequally dentate lobes: scape bearing a many-fl'd. umbel subtended by linear bracts; fls. white, rose, or purple, the throat usually striped,  $1\frac{1}{2}$ –2 in. across; calyx glabrous, with linear teeth as long as tube; corolla-tube longer than calyx. (P. F. von Siebold, page 87.) Japan.—There are vars. with fringed fls.

11. *P. cortusoides*, L. Pubescent, 6–12 in. high, blooming in May out-of-doors: lvs. ovate-oblong, 2–4 in. long, cordate or subcordate at base, the petioles longer than blades, irregularly many-notched: scape bearing a many-fl'd. umbel subtended by linear bracts; fls. rose-colored, 1 in. or less across, short-pedicelled; calyx-lobes lanceolate, about length of tube, slightly pubescent. W. Siberia.

12. *P. denticulata*, Sm. From 4–8 in. high, often planted in rockeries: lvs. ovate-lanceolate, about 2 in. long but usually not full grown until after flowering, obtuse, narrowed into winged petiole, sharply denticulate, more or less farinose, with fleshy leafy bracts at base: scape bearing a many-fl'd. head subtended by lanceolate bracts; fls. lilac,  $\frac{1}{2}$  in. or less across, very short-pedicelled; calyx deeply cut into narrow lobes; corolla-tube twice as long as calyx. Himalayas.—There are purple- and white-fl'd. forms and also one with lvs. bordered white. Var. *cache-miriana*, Hook. f. (*P. cashmeriana*, Hort.), is more farinose than type, fls. rich purple with yellow center, blooming when the lvs. are nearly full grown.

13. *P. Auricula*, L. (*Auricula lutea*, Opiz). Herb to 8 ft. high, often densely farinose, grown in greenhouses and frames and also in rockeries: lvs. thick, obovate or oblong-lanceolate, 2–4 in. long, obtuse or acute, attenuate at base, margins cartilaginous, entire or dentate, sometimes ciliate: scape bearing a many-fl'd. umbel subtended by small ovate farinose bracts; fls. originally bright yellow but of many colors in cult., 1 in. across, often fragrant; calyx about  $\frac{1}{4}$  in. long, divided to middle; corolla-tube twice as long as calyx. (*Auricula* is an ante-Linnæan name, arising from frequently auricled lvs.) Alps of Eu.

14. *P. veris*, L. (*P. officinalis*, Hill). COWSLIP. Soft-pubescent plant from 4–8 in. high, well suited for borders and rockeries: lvs. ovate to ovate-oblong, 2–3 in. long, obtuse, contracted or attenuate at base into winged petiole as long as or shorter than blade, crenate: scape bearing a many-fl'd. umbel subtended by small linear bracts; fls. bright yellow, rarely purplish, fragrant,  $\frac{1}{2}$ –1 in. across; calyx about  $\frac{1}{2}$  in. long, pubescent, with short ovate-acute lobes; limb of corolla concave, with scale-like folds at the slightly contracted mouth: caps. oval, about one-half length and included in calyx. Eu.—There are forms in which the calyx is much larger.

15. *P. elatior*, Hill. OXSLIP. Closely resembling the above but differing in its usually flat corolla-limb without folds and not contracted at mouth, the narrowly lanceolate calyx-lobes, and the oblong caps. as long as or longer than calyx. Eu. to Persia.

16. *P. polyantha*, Mill. (*P. variabilis*, Hort.). A garden group including the common hardy spring-blooming primula, probably hybrid of *P. veris*, *P. elatior*, and *P. vulgaris*: it grows from 6–12 in. high, the scapes usually exceeding the obovate obtuse lvs. which are narrowed into a winged petiole and bearing a many-

fld. umbel or the fls. sometimes solitary and nearly scapeless; fls. of many colors, yellow, red and yellow, orange, bronze, maroon, or white, sometimes double.

17. *P. vulgaris*, Huds. (*P. acaulis*, Hill). To 6 in. high: lvs. oblong or obovate-oblong, about 2 in. long, obtuse, narrowed into petiole shorter than blades, crenulate, more or less pilose or glabrescent: scape none, the fls. solitary on long pubescent pedicels, pale yellow, purple, or blue, becoming green in drying, 1-1½ in. across; calyx pubescent, the narrow lanceolate-acuminate lobes several times shorter than tube; throat of corolla slightly contracted and with scale-like folds. Eu.—There are double-fld. kinds.

2. **ANDROSACE**, L. ROCK-JASMINE. Annual or perennial herbs sometimes planted in rock-gardens; about 85 species in Eu., Asia, N. Amer.—Distinguished from *Primula* only by the tube of the corolla being shorter than the calyx and the corolla constricted at the throat. (Andros-ace: old Greek name, of no significance here.)

Lvs. all basal. .... 1. *A. sarmentosa*  
Lvs. basal and cauline. .... 2. *A. lanuginosa*

1. *A. sarmentosa*, Wall. Stoloniferous: lvs. in a basal rosette, lanceolate or ovate-lanceolate, ½-1½ in. long, acute, entire, sessile, white-pubescent when young: scape upright to 4 in. high, hairy; fls. in many-fld. umbels subtended by linear-lanceolate ciliate bracts, rose-colored, about ½ in. across. Himalayas.—Var. **Chumbyi**, Hort. Rosette dense, plant very cespitose: lvs. densely woolly.

2. *A. lanuginosa*, Wall. Whole plant densely white-pubescent: lvs. rosulate and cauline, lanceolate-ovate, ½-¾ in. long, acute, sessile: scapes axillary, about 2 in. long; fls. in umbels subtended by lanceolate or linear bracts, rose-colored, about ½ in. across. Himalayas.

3. **CYCLAMEN**, L. Nearly 20 species of tuberous scapose herbs in Medit. region and Cent. Eu., one a well-known florists' plant.—Lvs. cordate or reniform, long-petioled, entire or sinuate-dentate: scapes bearing a single nodding fl.; calyx 5-parted; corolla-lobes much longer than tube, strongly reflexed and contorted; stamens 5, inserted at base of corolla-tube, the nearly sessile anthers acuminate and included: caps. globose or ovoid, dehiscent from top to base by 5 valves, the valves becoming reflexed. (Cyc-lamen: classical Greek name.)

*C. indicum*, L. (*C. persicum*, Mill.) **FLORISTS CYCLAMEN**. Tuber large and corky on outside, flattened endwise: lvs. cordate-ovate, acutish, crenate-dentate, appearing with the fls.: scape 6-8 in. high; fls. in spring or in winter under glass, white or rose, dark purple at the slightly contracted mouth, about 1½ in. long; corolla-lobes oblong-spatulate, not eared at base; pedicels not coiling in fr. Greece to Syria.—There are large-fld. strains (var. *giganteum*) in colors from white to red and purple, and also kinds having double, crested, or fimbriate fls.

4. **DODECATHEON**, L. **SHOOTING-STAR**. Perennial scapose herbs of about 30 species in N. Amer.—Lvs. entire or repand, contracted into a more or less winged petiole: scape bearing an involucre several- to many-fld. umbel; fls. nodding; calyx 5-parted, the lobes reflexed at first; corolla-tube short, the 5 lobes reflexed, unequal, imbricated; stamens 5, attached at throat of corolla, the long slender anthers connivent into a cone and exerted: caps. oblong or cylindric, dehiscent by 5 valves. (Dodeca-theon: Greek *twelve gods*, old name of no application here.)—Many of these attractive plants may be transferred from the wild, but the following is the common shooting-star in gardens.

*D. Meadia*, L. Erect glabrous herb to 2 ft. high: lvs. ovate-oblong or oblong-linear, to 6 in. or more long, obtuse, narrowed into a winged petiole, dentate-crenate or nearly entire: scape often purple-spotted, bearing a 10-20-fld. umbel subtended by lanceolate bracts; fls. in May-June, about 1 in. long, the linear-oblong corolla-lobes rose and white at base, anthers reddish-yellow and the broadly ovate connective body purple: caps. about ½ in. long, exceeding the calyx. (Named for Richard Mead, 1673-1754, English physician.) Pa. west and south.

5. **LYSIMACHIA**, L. **LOOSESTRIFE**. About 100 species of mostly perennial herbs of wide distribution in temp. and subtemp. regions, sometimes grown in

moist situations in the garden.—Lvs. alternate, opposite or whorled, entire, often glandular-punctate: fls. solitary in the axils, or in racemes, corymbs, or panicles; calyx 5-6-parted; corolla rotate or campanulate, 5-6-parted; stamens 5-6, inserted on corolla-tube, slightly monadelphous, staminodia none: caps. ovoid or globose, dehiscent by 5 valves. (*Lysimachia*: probably after King *Lysimachus*.)—The plant sometimes advertised as *L. ciliata* is *Steironema ciliatum*, Raf., a slender herb to 4 ft. high, with opposite ovate to ovate-lanceolate lvs. and ciliate petioles, axillary slender-peduncled yellow fls. having staminodia alternating with the 5 stamens.

Of creeping habit.....1. *L. Nummularia*  
Of upright habit.

Color of fls. yellow.

Fls. in axillary whorls; corolla-lobes glandular-ciliate.....2. *L. punctata*

Fls. in leafy panicles; corolla-lobes glabrous.....3. *L. vulgaris*

Color of fls. white.

Plant glabrous.....4. *L. Fortunei*

Plant puberulent.....5. *L. clethroides*

1. *L. Nummularia*, L. MONEYWORT. CREEPING JENNY or CHARLIE. Glabrous: sts. creeping, sometimes 2 ft. long, making a good ground-cover and also suitable for baskets: lvs. opposite, orbicular, to 1 in. long, obtuse, rounded or slightly cordate at base, short-petioled: fls. yellow, dark-dotted,  $\frac{2}{3}$ -1 in. across, solitary in the axils, blooming June-Aug. (*Nummularia*: from *nummus*, coin, referring to the shape of the lvs.) Eu.; naturalized in E. U. S.—There is a var. with bright yellow lvs.

2. *L. punctata*, L. Usually densely pubescent: sts. erect, simple or branched, to 3 ft. high: lvs. verticillate in 3's or 4's, ovate-lanceolate, 1-3 in. long, acute, nearly sessile: fls. yellow, about  $\frac{3}{4}$  in. across, in axillary whorls, blooming June-July; corolla-lobes glandular-ciliate. Eu.; naturalized in E. U. S.

3. *L. vulgaris*, L. Densely pubescent herb to 3 ft. high with erect branched sts.: lvs. verticillate in 3's or 4's or sometimes opposite, ovate-lanceolate, 2-4 in. long, acute, nearly sessile: fls. yellow,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, in terminal leafy panicles or in the upper axils; calyx often dark-margined; corolla-lobes glabrous. Eu., Asia; naturalized in E. U. S.

4. *L. Fortunei*, Maxim. Glabrous herb to  $1\frac{1}{2}$  ft. high, with erect nearly simple brown st.: lvs. alternate, oblong-lanceolate, 2 in. or more long, tapering at both ends, cartilaginous-margined: fls. white, in a dense many-fl'd. raceme, the bracts as long as pedicels. (Robt. Fortune, page 447.)

5. *L. clethroides*, Duby. Puberulent or rarely glabrous, to 3 ft. high: lvs. alternate, ovate-lanceolate, 3-6 in. long, tapering at both ends, the margins revolute: fls. white, nearly  $\frac{1}{2}$  in. across, in a slender terminal spike, the bracts longer than the pedicels. China, Japan.

6. *ANAGALLIS*, L. PIMPERNEL. Creeping or erect herbs of about 25 species in many parts of the world, a few grown in gardens.—Lvs. opposite, alternate or verticillate, sessile or short-petioled, entire: fls. axillary, mostly solitary, pedicelled; calyx deeply 5-parted, the lanceolate or subulate lobes spreading; corolla deeply 5-parted, rotate or rotate-campanulate, the lobes obovate or linear; stamens 5, inserted at base of corolla, distinct or united at base, usually pubescent: caps. globose, circumscissile. (*Anagallis*: Greek *delightful*.)

Fls.  $\frac{1}{4}$  in. across: lvs. ovate.....1. *A. arvensis*

Fls.  $\frac{3}{4}$  in. across: lvs. linear or linear-lanceolate.....2. *A. linifolia*

1. *A. arvensis*, L. POOR MANS WEATHERGLASS (fls. close at approach of bad weather). Much-branched annual with procumbent or ascending 4-angled sts.: lvs. opposite or in 3's, ovate,  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, sessile, acutish, black-dotted beneath: fls. scarlet or white, about  $\frac{1}{4}$  in. across, on pedicels longer than lvs.; calyx slightly shorter than corolla; lobes of corolla finely toothed. Widely distributed.—Var. *cærulea*, Gren. & Godr., has blue fls.

2. *A. linifolia*, L. (*A. grandiflora*, Andr.). Perennial or biennial with 4-angled sts. to  $1\frac{1}{2}$  ft. high woody at base: lvs. opposite or verticillate, linear or linear-lanceolate, about 1 in. long, acute, sessile, the margins often revolute: fls. blue,

reddish beneath, about  $\frac{3}{4}$  in. across, on pedicels two to four times longer than lvs.; calyx half as long as corolla; lobes of corolla entire. Medit. region.—In var. **Monelli**, Knuth, the ovate or oblong lvs. are often in 3's and var. **collina**, Ball, has rose or purplish fls.

### 135. PLUMBAGINACEÆ. PLUMBAGO or LEADWORT FAMILY

About 10 genera and 300 species of herbs and shrubs of wide geographical distribution, usually in saline situations; many are grown in gardens and a few in the greenhouse.—Acaulescent with lvs. in a rosette or with elongated branched sts. and alternate lvs.: fls. bisexual, regular, in spikes, heads or panicles; calyx bracted at base, tubular or funnelform, 5-toothed or -lobed, 5 15-ribbed, plaited, often scarious and colored; corolla of 5 hypogynous petals united into tube or connate only at base; stamens 5, opposite petals, hypogynous or inserted on corolla; ovary superior, 1-celled with 1 ovule; styles 5, separate or united: fr. usually inclosed by calyx, dehiscent or indehiscent.

Plant with leafy sts.: calyx scarious only between the 5 ribs, lobes erect; corolla with long slender tube.

Stamens free; calyx glandular.....1. **PLUMBAGO**

Stamens attached to corolla-tube; calyx not glandular.....2. **CERATOSTIGMA**

Plant usually with naked scapes: calyx scarious, colored, spreading, 10-ribbed; petals connate only at base.

Fls. in racemes, cymes or panicles.....3. **LIMONIUM**

Fls. in dense heads.....4. **STATICE**

1. **PLUMBAGO**, L. **LEADWORT**. Mostly perennial herbs or subshrubs, sometimes climbing, in the tropics and subtropics, a few grown in greenhouses or out-of-doors in warm countries.—Lvs. auricled at base or clasping, entire: fls. in spikes at the ends of the branches, the bracts shorter than calyx; calyx tubular, glandular, scarious only between the 5 ribs, the 5 short lobes erect; corolla salverform, with slender tube and 5 spreading lobes; stamens free from corolla: fr. a membranaceous circumscissile caps., the deciduous part often splitting into 5 valves from below. (*Plumba-go*: Latin for *lead*, of doubtful application.)

Fls. blue or white.....1. *P. capensis*

Fls. red.....2. *P. indica*

1. **P. capensis**, Thunb. Semi-climbing subshrub or in the greenhouse upright and straggling, glabrous except in the infl.: lvs. oblong or oblong-spatulate, about 2 in. long, obtuse and shortly mucronate, tapering into short petiole: fls. in short spikes, azure-blue; corolla-tube about  $1\frac{1}{2}$  in. long; calyx pubescent, with stalked glands on upper part. S. Afr.—There is a white-fl. var.

2. **P. indica**, L. (*P. rosea*, L.). Glabrous, more or less climbing, the sts. striated: lvs. ovate-elliptic, to 4 in. long, tapering into a short somewhat clasping petiole: fls. in long racemes, purplish-red; corolla-tube about 1 in. long; calyx pubescent with stalked glands. S. Asia.—A race has larger scarlet fls.

2. **CERATOSTIGMA**, Bunge. Four or 5 diffuse perennial herbs often woody at base, native in China, Himalayas, and Abyssinia, one grown as a bedding and border plant.—Lvs. more or less ciliate: fls. in dense terminal bracted clusters or heads; calyx tubular, deeply 5-parted, not glandular, 10-nerved at base; corolla salverform, with slender tube and 5 spreading lobes; stamens attached to middle of corolla-tube: fr. a circumscissile caps. splitting into 5 valves. (*Ceratostig-ma*: Greek *horned stigma*.)

**C. plumbaginoides**, Bunge (*Plumbago Larpentæ*, Lindl.). To 1 ft. high: lvs. broadly obovate, to 3 in. long, tapering at base, strongly ciliate: fls. deep blue, about  $\frac{1}{2}$  in. across, blooming late in fall; sepals and bracts ciliate. China.

3. **LIMONIUM**, Mill. (*Statice*, Willd.). **SEA LAVENDER**. Perennial herbs, or sometimes annual or shrubby, of about 180 species widely distributed, often



grown in rockeries, greenhouses or for cut-fls.; some are useful for dry bouquets; those in cult. are summer-flowering.—Lvs. radical and tufted or alternate along st. in the shrubby species, entire or pinnatifid: fls. in branched cymose panicles or spikes, subtended by scale-like bracts; calyx tubular, scarious, often colored, spreading, 10-ribbed at base; petals free or connate only at base, clawed; stamens inserted at base of petals: fr. inclosed in calyx, indehiscent or dehiscent. (Limo-nium: ancient Greek name, probably from meadow.)—The application of the generic names *Limonium* and *Statice* was long transposed.

- A. Lvs. not pinnatifid.
  - B. Fls. in dense cylindrical spikes..... 1. *L. Suworowi*
  - BB. Fls. in one-sided spikelets, in a corymbosely-panicled infl.
    - c. Calyx white; corolla red or blue.
      - D. Length of lvs. 4-10 in.
        - E. Plant covered with short stellate hairs..... 2. *L. latifolium*
        - EE. Plant glabrous.
          - F. Corolla red; stigma capitate..... 3. *L. tataricum*
          - FF. Corolla bluish-lilac; stigma cylindrical-filiform..... 4. *L. vulgare*
      - DD. Length of lvs. 1½ in. or less..... 5. *L. reticulatum*
    - cc. Calyx blue or purple; corolla yellow, whitish or rose.
      - D. Corolla rose..... 6. *L. Gmelini*
      - DD. Corolla yellow or whitish.
        - E. Floral branches winged.
          - F. Lvs. sessile..... 7. *L. macrophyllum*
          - FF. Lvs. petioled..... 8. *L. arborescens*
        - EE. Floral branches not winged..... 9. *L. Preuxii*
  - AA. Lvs. pinnatifid.
    - B. Spikes dense, cylindrical..... 10. *L. spicatum*
    - BB. Spikes loose, secund.
      - c. Calyx blue or purple..... 11. *L. sinuatum*
      - cc. Calyx yellow..... 12. *L. Bonduelli*

1. *L. Suworowi*, Kuntze (*Statice Suworowi*, Regel). Glabrous annual to 1½ ft. high: lvs. all basal, oblong-lanceolate, 6-8 in. long, entire or coarsely toothed: scapes several, bearing a long terminal dense cylindrical spike and many sessile lateral ones 4-6 in. long; calyx green with lavender limb; corolla tubular, lavender. (Named for Iwan Petrowitsch Suworow, inspector of military hospitals in Turkestan forces.) W. Turkestan.—There is a white-fl. var.

2. *L. latifolium*, Kuntze (*Statice latifolia*, Sm.). Perennial to 2 ft. high, covered with short stellate hairs: lvs. oblong-elliptic, to 10 in. long, obtuse, narrowed into long petiole: scapes tall and very much branched, the 1-2-fl. spikelets forming short one-sided spikes; calyx white; corolla blue (white or rose-colored vars.). Russia, Bulgaria, Caucasus.

3. *L. tataricum*, Mill. (*Statice tatarica*, L. *Goniolimon tataricum*, Boiss.). Glabrous slightly glaucous perennial to 1 ft. high: lvs. obovate or oblong-lanceolate, 4-6 in. long, acuminate and mucronate, narrowed to petiole: scape soon branching, the 1-2-fl. spikelets forming one-sided spikes in the corymbosely panicled infl., the branches of which are narrowly 3-winged; calyx white; corolla ruby-red. S. E. Eu.—Var. *angustifolium*, Hubb. (*Statice incana*, Bieb.), has lanceolate narrower lvs. There is also a dwarf form.

4. *L. vulgare*, Mill. (*Statice Limonium*, L. *S. maritima*, Lam., in part). Glabrous perennial to 1 ft. or more high: lvs. elliptic-oblong, to 6 in. long, obtuse, mucronate, narrowed into long petiole: scape branched above into a corymbosely-paniculate infl., the 1-3-fl. spikelets densely imbricated in one-sided spreading or recurved spikes; calyx white or bluish; corolla bluish-lilac. Eu., N. Afr., Asia Minor.

5. *L. reticulatum*, Mill. (*Statice reticulata*, L. *S. caspia*, Willd. *S. bellidifolia*, Gouan). Glabrous rough-granular perennial to 8 in. high: lvs. obovate or lanceolate, ½-1½ in. long, obtuse, narrowed into petiole: scape very much branched, lower branches sterile, upper branches corymbosely-paniculate, the 2-3-fl. spikelets on one-sided spikes at ends of branchlets; calyx white; corolla pale lilac. Eu., E. Asia.

6. *L. Gmelini*, Kuntze (*Statice Gmelini*, Willd.). Perennial to 2 ft. high: lvs. ovate or obovate, obtuse, short-petioled or nearly sessile, glabrous: scape angled above, bearing a corymbosely panicle, of 2-fl. spikelets densely imbricated in short one-sided spikes; calyx dark purplish-blue; corolla rose. (Named for Johann Georg Gmelin, 1709-1755, German botanist.) Caucasus and Siberia.

7. *L. macrophyllum*, Kuntze (*Statice macrophylla*, Brouss. *S. Halfordii*, Hort.). Subshrub to 3 ft. high: lvs. large, obovate-spatulate, obtuse, sessile and attenuate at base, glabrous: scape with very many broadly winged branches, corymbose-paniculate, spikelets 2-fld., borne 2 together on one-sided spikes; calyx blue or purple; corolla yellow or almost white. Teneriffe.

8. *L. arborescens*, Kuntze (*Statice arborescens*, Brouss.). Shrub to 2 ft. high: lvs. ovate-oblong, to 10 in. long, obtuse, mucronate, attenuate into short petioles: scape with many narrowly winged branches, spikelets 2-fld. in short one-sided loose spikes; calyx blue; corolla yellow. Teneriffe.

9. *L. Preauxii*, Kuntze (*Statice Preauxii*, Webb). Glabrous subshrub to 2 ft. high: lvs. rotundate-triangular, 3-4 in. long, obtuse and mucronulate, truncate and short attenuate at base to petiole 4-5 in. or more long with a sheathing base: scape with many flattened but not winged branches, the spikelets in lax one-sided terminal spikes; calyx lavender; corolla pale yellow. (Named for Despréaux, who sent it from the Canaries.) Canary Isls.

10. *L. spicatum*, Kuntze (*Statice spicata*, Willd.). Annual to 6 in. high: lvs. oblong-lanceolate, obtuse, narrowed into short petiole, pinnately parted with obtuse lobes: scape bearing long dense cylindrical spikes often branched, the densely clustered spikelets 2-3-fld.; calyx hispid; corolla rose or white. Caucasus to Persia.

11. *L. sinuatum*, Mill. (*Statice sinuata*, L.). Rough-hairy perennial or biennial to 2 ft. high: lvs. lyrate-pinnatifid, about 8 in. long, the lobes and sinuses rounded, terminal lobe bearing a bristle: scape corymbosely-paniculate, the branches 3-5-winged, the wings below the forks produced into 3 linear-lanceolate appendages, spikelets 3-5-fld. in short one-sided spikes; calyx blue; corolla yellowish-white. Medit. region.—There are hybrid forms having yellow and white fls.

12. *L. Bonduelli*, Kuntze (*Statice Bonduelli*, Lest.). Annual or biennial to 2 ft. high, the sts. hairy at base: lvs. lyrate-pinnatifid, to 6 in. long, hairy and ciliate, with rounded lobes and sinuses, the terminal lobe mucronate: scape corymbosely-paniculate, the branches winged, below the forks the wings produced into 2-3 linear appendages, spikelets 1-3-fld., in terminal corymbs; bracts with green spines; calyx yellow; corolla deeper yellow. (Named for M. Bonduelle, military surgeon in N. Afr.) Algeria.

4. **STATICE**, L. (*Armeria*, Willd.). SEA-PINK. THRIFT. Perennial summer-flowering herbs with evergreen rosulate lvs., useful for borders and rock-gardens; about 50 species have been described from the north temp. zone and S. S. Amer., but by some authors reduced to 5 or 6.—Differs from *Limonium* in the fls. borne in dense globular heads subtended by scarious bracts forming a kind of involucre, the 2 lowest bracts reflexed and united into a sheath, the styles hairy below the middle. (Stat-ice: classical Greek name.)

Lvs. oblong-lanceolate, about  $\frac{1}{2}$  in. across: head  $1\frac{1}{2}$ -2 in. diam. .... 1. *S. pseudo-Armeria*  
Lvs. linear or linear-lanceolate,  $\frac{1}{4}$  in. or less across: head  $\frac{1}{2}$ -1 in. diam.

Calyx-tube pubescent: lvs. linear, 1-nerved. .... 2. *S. Armeria*  
Calyx-tube glabrous: lvs. linear-lanceolate, 3-5-nerved. .... 3. *S. plantaginea*

1. *S. pseudo-Armeria*, Paxt. (*Armeria latifolia*, Willd. *A. cephalotes*, Link & Hoffm. *A. formosa*, Hort.). Glabrous and glaucous, to  $1\frac{1}{2}$  ft. high: lvs. broadly oblong-lanceolate, about  $\frac{1}{2}$  in. wide, 5-7-nerved: head about  $1\frac{1}{2}$ -2 in. diam., the involucre dry; calyx with long teeth; corolla bright pink. S. Eu.

2. *S. Armeria*, L. (*Armeria vulgaris*, Willd. *A. maritima*, Willd.). To 1 ft. or more high: lvs. linear,  $\frac{1}{8}$  in. or less across, 1-nerved, acute or obtuse: scape glabrous or pubescent, bearing a head  $\frac{1}{2}$ -1 in. diam. subtended by scarious bracts, the outer ones shorter than the head; calyx-base decurrent on the short pedicel, pubescent at least on the nerves; corolla pink, purple, or white. (*Armeria* is an early substantive.) Eu., N. Amer., Chile.—There are several named color variants. Var. *Laucheana*, Hubb., has light rose-colored fls.

3. *S. plantaginea*, All. (*Armeria plantaginea*, Willd.). Differs from the above in being glabrous throughout, taller, lvs. linear-lanceolate, to  $\frac{1}{4}$  in. across, 3-5-nerved, and the outer bracts of the involucre usually with a long point exceeding the head. Eu.—There are several color races with pink to crimson fls. and tall vars. to 3 ft. high.

### 136. SAPOTACEÆ. SAPODILLA FAMILY

Shrubs or trees of wide distribution mostly in trop. regions; about 35 genera and 425 species, several grown for their edible frs. and one yielding gutta-

percha.—Juice usually milky: lvs. alternate, simple and entire, pinnately veined, commonly leathery and exstipulate: fls. bisexual, regular, solitary or fascicled in the axils of lvs. or at the lf.-scars on the naked branches; calyx usually of 4-6 separate sepals in 2 whorls, sometimes 5, imbricated; corolla gamopetalous, with as many or twice as many imbricated lobes as sepals in 1 or 2 whorls, often with entire or lacinate lobe-like appendages; stamens as many as corolla-lobes and opposite them, inserted on tube of corolla, often alternating with staminodia; ovary superior, 2- to many-celled, with 1 ovule in each cell; style and stigma 1: fr. a berry.

Fls. with staminodia.

Staminodia petal-like, appearing as if additional corolla-lobes.....1. SAPOTA

Staminodia filament-like.

Sepals 10, densely imbricated in several series.....2. ACHRAS

Sepals 4 or 5, in 1 or 2 series.....3. LUCUMA

Fls. without staminodia.

Stamens 12; sepals 6.....4. PALAQUIUM

Stamens and sepals usually 5.....5. CHRYSOPHYLLUM

1. **SAPOTA**, Mill. An evergreen tree native in trop. Amer. and extensively cult. in the tropics for its edible fr.—Lvs. petioled, crowded at ends of branchlets: fls. solitary in the axils, pedicelled; sepals 6, in 2 whorls, hairy outside; corolla urceolate, with 6 lobes half as long as tube; stamens 6, alternating with 6 petaloid staminodia; ovary villous, 10-12-celled: berry globose or conical, fleshy. (Sapo-ta: native name.)

**S. Achras**, Mill. (*Achras Sapota* not *A. Zapota*, L.). **SAPODILLA**. To 75 ft. high: lvs. ovate-elliptic to elliptic-lanceolate, 2-5 in. long, entire or emarginate, glabrous and shining: fls. white,  $\frac{1}{4}$  -  $\frac{1}{2}$  in. across: fr. 2  $3\frac{1}{2}$  in. diam., with thin rusty-brown scurfy skin and yellow-brown translucent flesh surrounding the shining black obovate seeds.

2. **ACHRAS**, L. (*Calocarpum*, Pierre). Trees native in Cent. Amer. and widely grown in trop. Amer. for the edible fr.—Lvs. clustered toward ends of branchlets: fls. nearly sessile, 6-12 together in axils of fallen lvs.; sepals 10, densely imbricated in several series; corolla with 5 imbricated lobes longer than tube; stamens 5, alternating with 5 linear staminodia; ovary villous, 5-celled: berry oblong or ovoid. (Ach-ras: from Greek for the pear-tree, referring to the resemblance of the frs.)

**A. Zapota**, L. (*Lucuma mammosa*, A. DC. *Vitellaria mammosa*, Radlk.). **SAPOTE. MARMALADE-PLUM**. Tree to 65 ft. high with thick trunk and stout branches: lvs. obovate to oblanceolate, to 16 in. long, obtuse or acute, attenuate at base, light green and glabrous: fls. white, about  $\frac{1}{2}$  in. across: fr. russet-brown, 3-6 in. long, with thick skin and firm reddish flesh, 1-seeded by abortion. Cent. Amer.

3. **LUCUMA**, Molina. A large genus of trees and shrubs mostly native in trop. Amer., several furnishing edible frs. and one widely planted.—Differing from *Achras* chiefly in the 4 or 5 sepals which are in 1 or 2 series. (Lucu-ma: Peruvian name of one species.)

**L. nervosa**, A. DC. (*L. Rivicoa* var. *angustifolia*, Miq.). **CANISTEL. TI-ES. EGG-FRUIT**. Small slender tree to 25 ft. high: lvs. oblong-obovate to oblanceolate, 4-8 in. long, acute, bright green and glabrous: fls. greenish-white: fr. globose to ovoid, 2-4 in. long, orange-yellow, with soft orange flesh and 2-3 seeds. N. S. Amer.; naturalized in S. Fla. and W. Indies.

4. **PALAQUIUM**, Blanco. More than 50 species of large trees native in E. Indies and Malaya, several yielding gutta-percha.—Lvs. leathery, stipulate: fls. in fascicles, pedicelled; sepals 6, in 2 whorls; corolla-tube as long as the 6 lanceolate acute lobes; stamens 12, in 2 series, staminodia 0; ovary villous, 6-celled: berry oblong or globose, fleshy. (Pala-quium: from native Philippine name.)

**P. Gutta**, Burck. (*Isonandra Gutta*, Hook.). To 40 ft. or more high: lvs. el-

liptic, 4 in. or more long, abruptly pointed, rusty-tomentose beneath, with numerous side veins: fls. small. Malaya.

5. **CHRYSOPHYLLUM**, L. Trees, of about 60 species in the tropics, particularly of Amer., one grown far S. for ornament and for the edible fr.—Lvs. leathery, often silky or tomentose beneath, with many parallel cross-veins: fls. small, fascicled, pedicelled or nearly sessile; sepals usually 5; corolla tubular-campanulate or somewhat rotate, with mostly 5 lobes; stamens 5, staminodia 0; ovary villous, 5–10-celled: berry globose to oblong, fleshy or leathery. (Chrysophyllum: Greek *golden leaf*, in reference to the color of the under side of lvs.)

C. **Cainito**, L. **STAR-APPLE**. Evergreen tree to 50 ft. high: lvs. oval or oblong, 3–5 in. long, covered beneath with silky golden-brown tomentum: fls. purplish-white: fr. usually globose, 2–4 in. diam., with smooth purple or light green skin and translucent whitish pulp surrounding the 3–8 seeds. (Cainito is an early American, or aboriginal, name.) Trop. Amer.

### 137. EBENACEÆ. EBONY FAMILY

Trees or shrubs with very hard wood, of about 6 genera and 275 species mostly of trop. and subtrop. range, one widely cult. for its edible frs.—Lvs. alternate, entire, exstipulate, usually leathery: fls. regular, diœcious or rarely bisexual or polygamous, solitary or cymose in the axils; calyx 3–7-lobed, persistent, often enlarging in fr.; corolla gamopetalous, 3–7-lobed, deciduous; stamens of same or twice the number of corolla-lobes or rarely more, inserted on base of corolla-tube, the filaments short, free or united at base; ovary superior, 2–16-celled with 1 or 2 ovules in each cell; styles 2–8, free or united at base, with entire or 2-lobed stigma: fr. a leathery or fleshy indehiscent berry, or drupe-like, or rarely dehiscent.

**DIOSPYROS**, L. **PERSIMMON**. **EBONY**. Nearly 200 species of wide distribution.—Fls. in few- to many-flid. axillary cymes or the pistillate solitary; corolla campanulate, urceolate or tubular, the lobes 3–7, usually 4–5; stamens 4 to many, commonly 16, mostly with 4–8 staminodia in pistillate fls.; ovary 4–16-celled: fr. a large juicy 1–10-seeded berry. (Diospyros: Greek *grain of Jove*, referring to the edible frs.)

Lvs. glabrous or pubescent only when young, cuneate or rounded at base. 1. *D. virginiana*  
Lvs. pubescent beneath, decurrent on petiole. 2. *D. Kaki*

1. **D. virginiana**, L. **COMMON PERSIMMON**. Round-headed deciduous tree to 50 ft. and more high, with spreading or pendulous branches: lvs. oval to ovate-oblong, 3–6 in. long, acuminate, cuneate, rounded or subcordate at base, glabrous or pubescent only when young, dark green and shining above, pale beneath: fls. greenish-yellow, the staminate  $\frac{1}{2}$  in. long with about 16 stamens, the pistillate to  $\frac{3}{4}$  in. long with 8 staminodia: fr. globose or obovate, 1–2 in. diam., on short thick st., pale orange, often with red cheek, with oblong flattened seeds. Conn. to Fla. and Tex.—There are several named vars., the frs. varying in size, shape, and flavor.

2. **D. Kaki**, L. f. (*D. chinensis*, Blume). Round-headed deciduous tree to 40 ft. high, the branches with appressed brownish pubescence: lvs. ovate-elliptic to obovate, 3–7 in. long, acuminate, decurrent on petiole, the outer side veins strongly deflected toward base, pubescent beneath, glabrous and shining above: fls. yellowish-white,  $\frac{3}{4}$  in. long, the staminate with 16–24 stamens, the pistillate with 8 staminodia: fr. oblate to slender conical, usually ribbed at base, 1–3 in. diam., with thin orange-yellow to reddish skin and orange-colored pulp surrounding the elliptic flattened seeds. (Kaki: Japanese name.) Japan, China.—**D. Lotus**, L., is sometimes used as a stock on which to graft the kaki; it is distinguished by its glabrous branches and the yellow globular fr. becoming black when ripe,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam. Asia.

### 138. STYRACACEÆ. STORAX FAMILY

Six genera and about 115 species of trees and shrubs in the warmer parts of N. and S. Amer., E. Asia, and Medit. region; a few planted for ornament.



—Lvs. alternate, entire or dentate, exstipulate: fls. bisexual, regular, in axillary and terminal fascicles or racemes or rarely solitary; calyx campanulate or tubular, 4-5-lobed; corolla 4-5-lobed, the petals usually united only at base; stamens twice as many as petals, rarely the same number, in 1 series, filaments united at base; ovary superior or partly inferior, 3-5-celled at base, 1-celled at top, with 1 or few ovules in each cell; stigma simple or 2-5-lobed: fr. a berry or drupe, or often dry and dehiscent by 3 valves, sometimes winged; seeds usually 1 in each cell of fr., some of the ovules failing.

Ovary superior or only slightly inferior: fr. not winged.....1. STYRAX  
Ovary inferior: fr. winged longitudinally.....2. HALEZIA

1. **STYRAX**, L. **STORAX**. Deciduous or evergreen shrubs or trees of about 100 species in trop. and subtrop. regions, grown for the attractive fls.—Lvs. petioled, entire or slightly serrate, more or less stellate-pubescent: fls. in axillary and terminal simple or branched racemes; calyx free or adnate to base of ovary, obscurely 5-toothed; corolla 5-parted; stamens 10, inserted on base of corolla, monadelphous below; ovary superior or only slightly inferior, 3-celled at base, with several ovules in each cell: fr. a globose or oblong drupe, fleshy or dry, often dehiscent. (Sty-rax: ancient Greek name for one of the species.)

Lvs. orbicular or broadly elliptic, 3-10 in. long, pubescent beneath: racemes many-fl'd.....1. *S. Obassia*  
Lvs. ovate or obovate, 1-3 in. long, glabrous: racemes few-fl'd.....2. *S. japonica*

1. *S. Obassia*, Sieb. & Zucc. Deciduous shrub or small tree to 30 ft. high, the young branchlets pubescent: lvs. broadly oval to orbicular, 3-10 in. long, abruptly acuminate, usually rounded at base, remotely dentate above middle, glabrous above, pubescent beneath: fls. in May, white, fragrant, drooping, about  $\frac{3}{4}$  in. long, in racemes 4-8 in. long; calyx and pedicels tomentose: fr. ovoid, pointed,  $\frac{3}{4}$  in. long, tomentose, irregularly dehiscent. (Obassia: native Japanese name.) Japan.

2. *S. japonica*, Sieb. & Zucc. Deciduous shrub or small tree to 30 ft. high, young branchlets and lvs. pubescent but soon glabrous: lvs. oval or obovate, 1-3 in. long, tapering at both ends, crenately serrulate: fls. in June-July, white, fragrant, drooping, about  $\frac{1}{2}$  in. long, in 3-6-fl'd. short glabrous racemes, pedicels 1-1 $\frac{1}{2}$  in. long: fr. ovoid, about  $\frac{1}{2}$  in. long, tomentose, dehiscent by 3 valves. Japan, China.

2. **HALESIA**, Ellis. **SILVER-BELL**. **SNOWDROP-TREE**. Three species of deciduous trees or shrubs native in N. Amer.—More or less stellate-pubescent: lvs. denticulate, petioled: fls. in axillary clusters or short racemes on branchlets of previous year; calyx adnate to ovary, shortly 4-toothed; corolla campanulate, 4-lobed or -parted; stamens 8-16, more or less monadelphous; ovary inferior, 2-4-celled with 4 ovules in each cell: fr. an oblong dry indehiscent drupe with 2-4 longitudinal wings and crowned by persistent style and calyx-teeth. (Hale-sia: named for Stephen Hales, 1677-1761, author of a famous work on "Vegetable Staticks.")

*H. carolina*, L. (*H. tetraptera*, Ellis. *Mohrodendron carolinum*, Britt.). To 40 ft. high: lvs. ovate, ovate-oblong, or obovate-lanceolate, 2-6 in. long, acuminate, cuneate or rounded at base, finely serrate, glabrous above, pubescent beneath: fls. white, drooping,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, in 2-4-fl'd. clusters with the lvs. in Apr.-May, pedicels 1-1 $\frac{1}{2}$  in. long: fr. obovate-oblong, 1-1 $\frac{1}{2}$  in. long, 4-winged. W. Va. to Fla., west to Ill.—Var. *Meehani*, Perkins, has smaller fls., shorter pedicels and thicker rugose lvs. (Named for Thos. Meehan, 1826-1901, American nurseryman.)

### 139. OLEACEÆ. OLIVE FAMILY

Trees and shrubs of about 20 genera and over 500 species widely distributed in temp. and trop. regions, one furnishing the olive and several grown for ornament.—Lvs. opposite or rarely alternate or verticillate, simple or pinnate, entire or dentate, usually exstipulate: fls. regular, bisexual or rarely diœcious or polygamous, in terminal or axillary panicles, cymes or fascicles; calyx

usually 4-lobed, often small or none; corolla of 4 or more free or united petals, rarely lacking; stamens 2, sometimes 3-5, hypogynous or epipetalous, the filaments commonly short; ovary superior, 2-celled with 2 (sometimes 4-10) ovules in each cell; style commonly short: fr. a drupe, berry, caps., or samara. *E*, Fig. 12, page 570.

Foliage evergreen.

Fr. a drupe or berry: lvs. simple.

Infl. axillary.

Corolla-lobes valvate: lvs. (in ours) silvery-lepidote beneath: grown for its edible fr. .... 1. *OLEA*

Corolla-lobes imbricate: lvs. green and glabrous beneath: grown for ornament.

Drupe with hard somewhat woody endocarp: fls. (in ours) on slender pedicels about  $\frac{1}{2}$  in. long. .... 2. *OSMANTHUS*

Drupe with thin crustaceous endocarp: fls. very short-pedicelled. .... 3. *PHILLYREA*

Infl. terminal. .... 4. *LIGUSTRUM*

Fr. a 2-lobed berry: lvs. pinnate (sometimes reduced to 1 lft. but the petiole articulated). .... 5. *JASMINUM*

Foliage deciduous.

Fr. a dehiscent caps., the seeds winged.

Fls. yellow, before the lvs. .... 6. *FORSYTHIA*

Fls. white, rose, or lilac, with the lvs. .... 7. *SYRINGA*

Fr. a winged samara. .... 8. *FRAXINUS*

Fr. a drupe or berry.

Corolla of linear petals only slightly united at base. .... 9. *CHIONANTHUS*

Corolla funnelform or salverform.

Lvs. simple: berry not lobed. .... 4. *LIGUSTRUM*

Lvs. pinnate (sometimes reduced to 1 lft. but petiole articulated): berry 2-lobed. .... 5. *JASMINUM*

1. *OLEA*, L. OLIVE. Nearly 40 species of evergreen trees and shrubs native in trop. and warm parts of the Old World to New Zeal., one extensively grown for its edible fr.—Lvs. opposite, usually entire: fls. white, bisexual, diœcious, or polygamous, in axillary branching panicles or fascicles; calyx short, 4-toothed; corolla with short tube and 4 valvate lobes or 0; stamens 2: fr. an oblong or ovoid drupe. (*O-lea*: classical Latin name.)

*O. europæa*, L. To 25 ft. or more high, with thornless nearly terete branches: lvs. elliptic, oblong or lanceolate, 1-3 in. long, dark green above, densely silvery-lepidote beneath: panicles shorter than lvs., the fls. fragrant: drupe subglobose or oblong, black and shining when ripe, from  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long. Medit. region.—The wild form, var. *Oleaster*, DC., has 4-angled thorny branches, broader lvs. and smaller frs.

2. *OSMANTHUS*, Lour. Evergreen shrubs or small trees of about 10 species in Asia, Pacific Isls., and N. Amer., a few grown out-of-doors in warm regions and one a favorite greenhouse subject.—Lvs. opposite, entire or serrate: fls. bisexual, polygamous, or diœcious, in axillary fascicles or short racemes; calyx short, 4-toothed; corolla with short tube and 4 imbricate lobes; stamens 2, rarely 4: fr. an ovoid drupe with hard somewhat woody endocarp. (*Osmanthus*: Greek *fragrant flower*.)

Lvs. entire or with small teeth. .... 1. *O. fragrans*

Lvs. with a few coarse spiny teeth resembling holly, rarely entire.

Length of lvs. 1-2 $\frac{1}{2}$  in.; teeth about 4 on each side. .... 2. *O. Aquifolium*

Length of lvs. 3-4 in.; teeth 8 or more on each side. .... 3. *O. Fortunei*

1. *O. fragrans*, Lour. (*Olea fragrans*, Thunb.). To 30 ft. high: lvs. elliptic to oblong-lanceolate, 2-4 in. long, acute or acuminate, cuneate at base, entire or finely and sharply dentate: fls. white, very fragrant, on slender pedicels  $\frac{1}{2}$ - $\frac{1}{2}$  in. long, in early spring: drupe about  $\frac{1}{2}$  in. long, bluish. Himalayas, China, Japan.

2. *O. Aquifolium*, Sieb. (*Olea Aquifolium*, Sieb. & Zucc. *Olea ilicifolia*, Hassk.) To 20 ft. high: lvs. oval to elliptic-oblong, 1-2 $\frac{1}{2}$  in. long, with 2-4 large spiny teeth on each side or rarely entire, dark green and very glossy above: fls. white, fragrant, on slender pedicels about  $\frac{1}{2}$  in. long, in June-July: fr.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, bluish. Japan.—Var. *myrtifolius*, Nichols., has smaller entire lvs. Var. *rotundifolius*, Nichols., is a dwarf form with lvs. about 1 in. long, entire or with short teeth. There are variegated-leaved forms.

3. *O. Fortunei*, Carr. (*O. Aquifolium* × *O. fragrans*). Differs from the above in its larger broader lvs. having 8-10 teeth on each side and less glossy above. (For Robt. Fortune, page 447.)

3. **PHILLYREA**, L. About 6 species of evergreen shrubs or small trees native in the Medit. region, planted out-of-doors in warm countries.—Closely related to *Osmanthus* and differing chiefly in the thin crustaceous endocarp of the drupe. (Phillyr-ea: ancient Greek name.)

Lvs.  $\frac{1}{2}$ -2 in. long: fr. about  $\frac{1}{4}$  in. long.

Shape of lvs. ovate to ovate-oblong. .... 1. *P. latifolia*

Shape of lvs. oblong- to linear-lanceolate. .... 2. *P. angustifolia*

Lvs. 3-5 in. long: fr.  $\frac{1}{2}$  in. long. .... 3. *P. decora*

1. *P. latifolia*, L. To 30 ft. high: lvs. ovate or oval to ovate-oblong,  $\frac{3}{4}$ -2 in. long, acute, rounded or slightly cordate at base, usually sharply serrate, dark green and shining above, pale beneath: fls. white, short-pedicelled, in May-June: fr. globose, about  $\frac{1}{4}$  in. long, blue-black. S. Eu., N. Afr.—Var. *spinosa*, Ait., has strongly toothed lvs. The plant known as *P. media*, L., is scarcely distinguishable; it has smaller lvs. entire or bluntly serrate.

2. *P. angustifolia*, L. Spreading shrub to 15 ft. high: lvs. oblong- to linear-lanceolate, 1-2 in. long, tapering at both ends, usually entire, dull green above: fls. white, fragrant, in May-June: fr. globose, pointed, about  $\frac{1}{4}$  in. long, blue-black. Medit. region.

3. *P. decora*, Boiss. & Bal. Spreading shrub to 10 ft. high: lvs. oblong to oblong-lanceolate, 3-5 in. long, acuminate, tapering at base, entire or remotely serrulate, dark green and shining above, paler below: fls. white, in June-July: fr. oblong-ovoid,  $\frac{1}{2}$  in. long, purplish-black. W. Asia.

4. **LIGUSTRUM**, L. PRIVET. PRIM. Deciduous or evergreen shrubs or rarely small trees planted for ornament and several much used for hedges; about 50 species in Asia, Australia, and 1 in Medit. region.—Lvs. opposite, entire: fls. bisexual, white, in terminal panicles; calyx campanulate, with 4 small teeth; corolla funnelform, mostly with rather short tube and 4 spreading lobes; stamens 2, attached to corolla-tube: fr. a berry-like drupe. (Ligus-trum: ancient Latin name.)—There are several Latin-named forms in the trade whose botanical position is uncertain; they may be mutants or of hybrid origin.

A. Foliage evergreen.

B. Lvs. linear-lanceolate. .... 1. *L. Massalongianum*

BB. Lvs. oblong or ovate.

C. Corolla-tube two to three times longer than limb. .... 2. *L. ovalifolium*

CC. Corolla-tube as long as or shorter than limb.

D. Under side of lvs. and young branchlets pubescent. .... 3. *L. nepalense*

DD. Under side of lvs. and young branchlets glabrous.

E. Tip of lvs. obtuse or emarginate. .... 4. *L. coriaceum*

EE. Tip of lvs. prevailing acute or acuminate.

F. Shrub or small tree to 20 ft. high: lvs. tapering at

base. .... 5. *L. lucidum*

FF. Shrub to 10 ft. or less high: lvs. prevailing rounded

at base. .... 6. *L. japonicum*

AA. Foliage deciduous.

B. Corolla-tube two to three times longer than limb.

C. Calyx pubescent. .... 7. *L. Ibota*

CC. Calyx glabrous or only pubescent at base.

D. Young branches and midrib of lf. beneath pubescent. .... 8. *L. amurense*

DD. Young branches and lvs. glabrous. .... 2. *L. ovalifolium*

BB. Corolla-tube as long as or shorter than limb.

C. Fls. sessile. .... 9. *L. Quihowi*

CC. Fls. pedicelled.

D. Stamens longer than limb: lvs. pubescent on midrib be-

neath. .... 10. *L. sinense*

DD. Stamens shorter than limb: lvs. glabrous. .... 11. *L. vulgare*

1. *L. Massalongianum*, Vis. Erect evergreen shrub to 3 ft. high, with warty pilose branchlets: lvs. linear-lanceolate or linear,  $1\frac{1}{2}$ -3 in. long, tapering at both ends, glabrous: fls. short-pedicelled, in many-fl. much-branched panicles to  $3\frac{1}{2}$  in. long, in July-Aug.; corolla-tube two to three times longer than limb. (Named for A. B. Massalongi, Italian botanist in middle of 19th century.) Himalayas.

2. *L. ovalifolium*, Hassk. (*L. californicum*, Hort.). CALIFORNIA PRIVET. Half-evergreen upright glabrous shrub to 15 ft. high, much planted for hedges: lvs. elliptic-ovate or oblong, 1-2½ in. long, acute, cuneate at base, dark green and glossy above, yellowish-green beneath: fls. very short-pedicelled, in erect many-fid. panicles to 3 in. long, in July; corolla-tube two to three times as long as limb: fr. shining black. Japan.—There are several kinds with variegated lvs.

3. *L. nepalense*, Wall. Evergreen shrub or tree, with pubescent branchlets: lvs. oblong or oblong-ovate, 2-5 in. long, acuminate, pubescent beneath: fls. in large broad panicles interspersed with petioled bracts, in July and Aug.; corolla-tube as long as or shorter than limb. Himalayas.

4. *L. coriaceum*, Carr. Stiff dense evergreen shrub to 6 ft. high, glabrous: lvs. orbicular or orbicular-ovate, 1½-2½ in. long, obtuse or emarginate, dark green and glossy above: fls. sessile, in compact pyramidal panicles to 4 in. long, in July; corolla-tube about length of limb: fr. black. Japan, but not known wild.

5. *L. lucidum*, Ait. Erect evergreen shrub or small tree to 20 ft. high, glabrous: lvs. ovate to ovate-lanceolate, 3-6 in. long, acute or acuminate, tapering at base, dark green and glossy above: fls. short-pedicelled, in erect panicles to 8 in. long, in July-Aug.; corolla-tube about as long as limb: fr. bluish-black. China, Japan.—There are variegated-leaved vars.

6. *L. japonicum*, Thunb. Very similar to *L. lucidum* but smaller, rarely to 10 ft. high: lvs. shorter, 2-3½ in. long, roundish-ovate to ovate-oblong, usually rounded at base, darker green: panicles looser. Japan.

7. *L. Ibota*, Sieb. Graceful deciduous shrub to 10 ft. high, with pubescent branchlets: lvs. elliptic to oblong-ovate, 1-2 in. long, acute, pubescent only on midrib beneath: fls. short-pedicelled, in nodding panicles to 1½ in. long borne on short branchlets in June-July; calyx pubescent; corolla-tube two to three times longer than limb: fr. black, at first with purplish bloom. (*Ibota*: native Japanese name.) Japan, China.—Var. *Regelianum*, Rehd., is a dwarfer denser shrub with horizontally spreading branches and more pubescent lvs. (Named for Eduard von Regel, 1815-1892, German botanist.)

8. *L. amurense*, Carr. Deciduous or almost half-evergreen shrub to 15 ft., with upright branches pubescent when young: lvs. oval or oblong, 1-2½ in. long, usually obtuse, glabrous except midrib of lf. beneath pubescent: fls. short-pedicelled, in erect panicles to 2½ in. long, in July; calyx glabrous or slightly pubescent near base; corolla-tube two to three times longer than limb: fr. black with a slight bloom. Japan, China.

9. *L. Quihoui*, Carr. Deciduous shrub to 6 ft. or more high, with spreading branches pubescent when young: lvs. elliptic- or narrow-oblong, 1-2 in. long, obtuse, glabrous: fls. sessile, in slender panicles to 8 in. long, in Sept.-Oct.; corolla-tube as long as limb; stamens exserted: fr. purplish, shining. (Named for M. Quihou, supt. of the Jardin d'Acclimatation at Paris.)

10. *L. sinense*, Lour. Deciduous shrub to 8 ft. or more high, with slender spreading branches and pubescent branchlets: lvs. elliptic to ovate-lanceolate, 1-3 in. long, acute or obtusish, tapering at base, pubescent on midrib beneath: fls. pedicelled, in loose pubescent panicles to 4 in. long, in July; corolla-tube about length of limb; stamens exserted: fr. blackish-purple. China, Korea.

11. *L. vulgare*, L. COMMON PRIVET. Deciduous shrub to 15 ft., with puberulous branchlets: lvs. oblong-ovate to lanceolate, 1-2½ in. long, obtuse or acute, glabrous: fls. pedicelled, in dense pyramidal panicles to 2½ in. long, in June-July; corolla-tube about length of limb; stamens included: fr. black. Eu., N. Afr., W. Asia; naturalized in E. U. S.—There are vars. with variegated lvs., yellow, white, or greenish frs., and of various habit.

5. JASMINUM, L. JASMINE. JESSAMINE. Climbing or erect shrubs grown out-of-doors in warm countries and in greenhouses N.; 200 or more species in trop. and subtrop. regions around the world.—Lvs. opposite or sometimes alternate, imparipinnate with 3-7 lfts. or reduced to 1 lft. but the petiole articulated: fls. in simple or dichotomous terminal cymes or rarely solitary; calyx funnelform or campanulate, with 4-9 teeth of varying length; corolla salverform, with a cylindrical tube and 4-9-lobed or -parted imbricated limb; stamens 2, the short filaments included: fr. a 2-lobed berry. (Jas-minum: ancient name of Arabic origin.)—The species in cult. are confused and in need of further study.



- A. Fls. pink or red..... 1. *J. Beesianum*  
 AA. Fls. yellow.  
   B. Lvs. opposite.  
     c. Limb of corolla  $\frac{3}{4}$ -1 in. across, shorter than tube..... 2. *J. nudiflorum*  
     cc. Limb of corolla  $1\frac{1}{2}$ -2 in. across, longer than tube..... 3. *J. primulinum*  
   BB. Lvs. alternate.  
     c. Calyx-teeth very short: lfts. 3-7..... 4. *J. humile*  
     cc. Calyx-teeth as long as tube: lfts. 3..... 5. *J. floridum*  
 AAA. Fls. white.  
   B. Lvs. apparently simple.  
     c. Teeth of calyx  $\frac{1}{4}$  in. or more long.  
       d. Calyx-teeth with dense spreading yellow hairs..... 6. *J. pubescens*  
     DD. Calyx-teeth with sparse close pubescence or glabrous.  
       E. Corolla-lobes acute..... 7. *J. gracillimum*  
       EE. Corolla-lobes obtuse..... 8. *J. Sambac*  
     cc. Teeth of calyx short,  $\frac{1}{8}$  in. or less long.  
       d. Calyx pilose..... 9. *J. nitidum*  
     DD. Calyx glabrous.  
       E. Tube of calyx of same length or longer than teeth..... 10. *J. calcareum*  
       EE. Tube of calyx much longer than teeth..... 11. *J. simplicifolium*  
   BB. Lvs. of 3-7 lfts.  
     c. Calyx-teeth very small..... 12. *J. azoricum*  
     cc. Calyx-teeth  $\frac{1}{4}$ - $\frac{2}{3}$  in. long.  
       d. Limb of corolla about  $\frac{1}{4}$  in. across: fl.-buds upright..... 13. *J. officinale*  
       DD. Limb of corolla about  $1\frac{1}{2}$  in. across: fl.-buds horizontal..... 14. *J. grandiflorum*

1. *J. Beesianum*, Forrest & Diels. Climbing to 3 ft., with slender grooved sts. somewhat pubescent at joints: lvs. simple, ovate-lanceolate or lanceolate, 1-2 in. long, acuminate, very short-petioled: fls. rose or pink, very fragrant, 1-3 together at ends of branchlets,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across; calyx-teeth linear, about  $\frac{1}{4}$  in. long; corolla-lobes broad-elliptic or suborbicular, about half as long as tube. (Named for Bees, Ltd., nurserymen, Liverpool, England.) W. China.

2. *J. nudiflorum*, Lindl. Nearly erect deciduous shrub to 15 ft. high, with 4-angled glabrous stiff branchlets: lvs. opposite, of 3 ovate mucronate ciliate lfts.  $\frac{1}{2}$ -1 in. long: fls. solitary, yellow,  $\frac{3}{4}$ -1 in. diam., borne in winter and spring on naked shoots, each fl. subtended by narrow green bracts; calyx-lobes leafy, spreading, as long as or longer than tube; corolla-lobes obovate, often wavy, about half as long as tube. China.—In one var. the lvs. are variegated with yellow.

3. *J. primulinum*, Hemsl. Evergreen floriferous rambling shrub to 10 ft. high, with glabrous 4-angled branchlets: lvs. opposite, of 3 oblong-lanceolate almost sessile lfts. 1-3 in. long: fls. solitary, bright yellow with darker eye,  $1\frac{1}{2}$ -2 in. across, subtended by lf.-like bracts; calyx-lobes leafy, lanceolate, longer than tube; corolla-lobes obovate-spatulate, longer than tube, often semi-double. W. China.

4. *J. humile*, L. (*J. revolutum*, Sims. *J. Wallichianum*, Lindl.). Diffuse evergreen shrub to 20 ft. high, requiring support, with glabrous angled branchlets: lvs. alternate, of 3-7 ovate to lanceolate acuminate lfts.  $\frac{3}{4}$ -2 in. long, the terminal one long-petioled, more or less revolute on edges: fls. bright yellow, fragrant,  $\frac{1}{2}$ -1 in. across, in open clusters; calyx-teeth triangular, about one-third as long as tube; corolla-lobes obtuse and reflexed, much shorter than tube. Trop. Asia.

5. *J. floridum*, Bunge. Nearly evergreen glabrous shrub with erect flexuous angled branches: lvs. alternate, of 3, rarely 5, oval or ovate-oblong acute lfts.  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long: fls. golden-yellow,  $\frac{1}{2}$  in. across, in open clusters; calyx-teeth as long as the angled tube; corolla-lobes ovate, acute, spreading, about half as long as tube. China.

6. *J. pubescens*, Willd. Densely pubescent climber: lvs. simple, ovate, to 2 in. long, acute, rounded or cordate at base, short-petioled: fls. white, about 1 in. across, in few- to many-fld. clusters, often half double; calyx-teeth about  $\frac{1}{2}$  in. or more long, densely covered with spreading yellow hairs; corolla-lobes oblong, acute, one-half or more as long as tube. India.

7. *J. gracillimum*, Hook. f. Closely resembling the above but differing in its more graceful floriferous habit, the branches less pubescent, the somewhat larger fragrant fls. with calyx-teeth sparsely clothed with close not spreading pubescence. N. Borneo.

8. *J. Sambac*, Soland. ARABIAN JASMINE. Climbing to 5 ft., with angular pubescent branchlets: lvs. simple or sometimes in 3's, elliptic- or broad-ovate,  $1\frac{1}{2}$ -3 in. long, acute or obtuse, rounded or cuneate at base, nearly glabrous, prominently veined, the short pubescent petiole abruptly curved upward: fls. white, fragrant,  $\frac{3}{4}$ -1 in. across, in few- to many-fld. clusters; calyx-teeth linear,  $\frac{1}{4}$  in. long, glabrous or hirsute on edges; corolla-lobes oblong to orbicular, obtuse, about length of tube. (Sambac: native Indian name.) India.—There are double-fld. kinds.

9. *J. nitidum*, Skan. Half-twining slender somewhat pubescent shrub: lvs. simple, elliptic-lanceolate, 2-3 in. long, short-acuminate, cuneate at base, pubescent on midrib beneath, petioles short and pubescent: fls. white, very fragrant,  $1\frac{1}{2}$  in. across; calyx pilose, the teeth linear and recurved, about  $\frac{1}{2}$  in. long; corolla-lobes linear-lanceolate, spreading. Admiralty Isls.

10. *J. calcareum*, F. Muell. Twining glabrous shrub: lvs. simple, oblong-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, acute or acuminate, cuneate at base, 3-5-nerved: fls. white, slender-pedicelled, about 1 in. across, in trichotomous cymes; calyx-teeth linear, as long as or longer than tube; corolla-lobes oblong, acute, half or more as long as tube. Australia; to be looked for in cult.

11. *J. simplicifolium*, Forst. Woody vine to 30 ft. or more, glabrous or pubescent: lvs. simple, ovate to elliptic,  $1-2\frac{1}{2}$  in. long, acute or obtuse: fls. white, fragrant, about  $\frac{3}{4}$  in. across, slender-pedicelled, in trichotomous cymes; calyx-teeth very short or sometimes almost wanting; corolla-lobes acute, about length of tube. Australia; naturalized in Bermuda.

12. *J. azoricum*, L. Evergreen climber, the terete branches tomentose when young but becoming glabrous: lvs. opposite, of 3 broadly ovate acute lfts. to 2 in. long: fls. white,  $\frac{1}{2}$ -1 in. across, in loose many-fl. cymes; calyx-teeth very short; corolla-lobes oblong, acute, half or more as long as tube. Canary Isls.

13. *J. officinale*, L. JESSAMINE of poetry. Deciduous shrub with long weak sts. requiring support, glabrous or nearly so: lvs. opposite, of 5-7 elliptic or ovate acute or acuminate lfts.  $\frac{1}{2}$ - $2\frac{1}{2}$  in. long, the terminal lfts. longer and petioled: fls. white, fragrant, about  $\frac{3}{4}$  in. across, slender-pedicelled, in loose clusters; calyx-teeth linear,  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, half or fully as long as corolla-tube; corolla-lobes oblong, acute, about as long as tube. Persia.—There are vars. with double fls. and with lvs. edged with yellow or silver.

14. *J. grandiflorum*, L. SPANISH JASMINE. Differs from the preceding in its more upright sts. which do not require support, the horizontal fl.-buds, the usually obtuse lateral lfts., the larger fls. often tinged outside with purplish, the proportionately shorter calyx-teeth and the corolla-lobes obtuse or sometimes rounded and minutely apiculate. India; naturalized in Fla.

6. **FORSYTHIA**, Vahl. GOLDEN-BELLS. Four species of deciduous shrubs native in China, Japan and S. E. Eu., very popular ornamental subjects.—Lvs. opposite, simple or ternate, entire or serrate, glabrous: fls. axillary, 1-3 or rarely 5, before the lvs., pedicelled, heterostylous; calyx deeply 4-parted; corolla campanulate, deeply 4-parted into oblong lobes; stamens 2, inserted at base of corolla-tube: fr. a woody septicidally dehiscent caps. with many winged seeds. (Forsythia, Forsythia: after Wm. Forsyth, 1737-1804, English horticulturist.)

Branches hollow between the nodes: lvs. ovate, often ternate.....1. *F. suspensa*

Branches usually with lamellate pith: lvs. ovate- or oblong-lanceolate.

Lvs. always simple: branches upright.....2. *F. viridissima*

Lvs. sometimes ternate: branches erect or arching: hybrid.....3. *F. intermedia*

1. *F. suspensa*, Vahl. To 8 ft. high, the branches becoming pendulous and often taking root: lvs. ovate to ovate-oblong, to 4 in. long, irregularly serrate, simple or 3-parted, rounded or broadly cuneate at base or the lfts. tapering: fls. golden-yellow, the tube within striped with orange-yellow, about 1 in. long, in Apr. or May, opening wide; calyx about as long as corolla-tube: caps. narrowly ovoid, acuminate, about 1 in. long. China.—Var. *Fortunei*, Rehd., is of stiffer more upright growth, often with ternate lvs. Var. *Sieboldi*, Zabel, has slender pendulous or trailing branches, lvs. mostly simple and solitary fls. There are kinds with variegated or pubescent lvs., purple branches, and paler fls.

2. *F. viridissima*, Lindl. Erect shrub to 10 ft. high, with olive-green branchlets: lvs. always simple, oblong-lanceolate or lanceolate, to 6 in. long, tapering at both ends, entire or irregularly serrate above the middle: fls. bright greenish-yellow,  $\frac{3}{4}$ -1 in. long, in Apr. or May, not opening wide; calyx about half or less as long as corolla-tube: caps. broadly-ovoid, about 1 in. long. China.—Less showy species than No. 1, the fls. with much narrower segms., borne close to sts. from ground up. There is a race with lvs. variegated white.

3. *F. intermedia*, Zabel (*F. suspensa*  $\times$  *F. viridissima*). Distinguished from *F. suspensa* by the branches with lamellate pith, the narrower oblong to ovate-lanceolate lvs. tapering at base, and from *F. viridissima* by its arching branches and the lvs. sometimes 3-parted.

7. **SYRINGA**, L. **LILAC**. Deciduous or rarely evergreen shrubs or small trees, of nearly 30 species in Eu. and Asia; the lilacs are amongst the most popular ornamental flowering shrubs.—Lvs. opposite, simple or rarely pinnate, entire: fls. in panicles from terminal or lateral buds; calyx campanulate, 4-toothed, persistent; corolla funnelliform, with cylindrical tube and 4-lobed limb; stamens 2, inserted on tube of corolla, included or exserted: fr. a leathery loculicidally dehiscent caps. with 2 winged seeds in each cell. (Syrin-ga: from Greek for *pipe*; of doubtful application.)

Corolla-tube much longer than calyx; stamens included.

Mature shoots with 1 true terminal bud that continues the axis the following year or else gives rise to an infl. in the line of the main axis.

Lvs. pubescent on the veins beneath: caps. obtuse.....1. *S. villosa*

Lvs. entirely glabrous: caps. acute.....2. *S. Josikæa*

Mature shoots ending in 2 lateral buds, the terminal one suppressed, giving rise the following spring to a lateral infl., the main axis not continuous.

Base of lvs. truncate or subcordate.....3. *S. vulgaris*

Base of lvs. attenuate.

Lvs. lanceolate: panicle 2-3 in. long.....4. *S. persica*

Lvs. ovate-lanceolate: panicle 3-6 in. long.....5. *S. chinensis*

Corolla-tube scarcely longer than calyx; stamens exserted.....6. *S. amurensis*

1. ***S. villosa***, Vahl. To 10 ft. high, the branches stout and upright: lvs. broadly elliptic to oblong, 2-7 in. long, shortly acuminate, attenuate at base, dark green above, pale beneath, the nerves pubescent, margins finely ciliate: panicles from a terminal bud or often 3 at the end of a leafy shoot, many-fl'd., 4-12 in. long, in May or June; fls. lilac or pinkish-white, about  $\frac{1}{2}$  in. long, scarcely fragrant: caps.  $\frac{3}{4}$ -1 in. long, obtuse. China.

2. ***S. Josikæa***, Jacq. Very similar to *S. villosa* but the lvs. glaucous and glabrous beneath, 2-5 in. long, the panicles denser, fls. deeper lilac, and caps. acute. (Named after Baroness von Josika, who sent the plant to Jacquin in 1830.) Hungary.—There are vars. with reddish and pale violet fls.

3. ***S. vulgaris***, L. **COMMON LILAC**. Upright glabrous shrub or small tree to 20 ft. high: lvs. ovate, 2-4 in. long, acuminate, truncate or subcordate at base: panicles from lateral buds, usually 2 at the end of a shoot, many-fl'd., 6-8 in. or more long; fls. lilac or white, about  $\frac{1}{2}$  in. long, fragrant, in May: caps.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, acute. E. Eu. and sometimes escaped in E. U. S.—There are many colors, from white, lilac, and blue to purplish-red, also double-fl'd. vars. and with variegated lvs.

4. ***S. persica***, L. **PERSIAN LILAC**. Glabrous shrub to 10 ft. high, with slender arching branches: lvs. lanceolate, 1-2 $\frac{1}{2}$  in. long, acuminate, attenuate at base: panicles from lateral buds, 2-3 in. long, many-fl'd.; fls. lilac or whitish, about  $\frac{1}{2}$  in. long, fragrant, in May-June; caps. 4-angled, about  $\frac{1}{2}$  in. long, obtuse. Caucasus to Afghanistan.—Var. ***laciniata***, Vahl, is of dwarfer habit, with pinnately lobed or pinnatifid lvs. There are forms with white and red fls.

5. ***S. chinensis***, Willd. (*S. persica*  $\times$  *S. vulgaris*. *S. rothomagensis*, Loud.). Intermediate between the parents, having ovate-lanceolate lvs. attenuate at base, and large many-fl'd. panicles to 6 in. long. There are white-, lilac- and deep purplish-red-fl'd. vars., also one with double purplish fls.

6. ***S. amurensis***, Rupr. Spreading or upright shrub to 12 ft. high: lvs. ovate or oval, 2-4 in. long, attenuate at base, glabrous: panicles from lateral buds, usually 2 at the end of a shoot, 4-6 in. long, glabrous; fls. yellowish-white,  $\frac{1}{4}$  in. or less long, almost odorless, in June; corolla-tube very short; stamens long-exserted: caps.  $\frac{3}{4}$ -1 in. long, acute. Manchuria.—Var. ***pekinensis***, Maxim. (*S. pekinensis*, Rupr.), is of spreading habit with usually oblong acuminate lvs. tapering at base; there is a form with pendulous branches. N. China. Var. ***japonica***, Franch. & Sav. (*S. japonica*, Decne.). An upright tree to 30 ft. high with oval or ovate-oblong lvs. slightly rounded at base and more or less pubescent beneath, the infl. to 12 in. long and sometimes pubescent; in one form the lvs. are variegated with white. Japan.

8. **FRAXINUS**, L. **ASH**. About 65 species of deciduous trees mostly native in the north temp. zone, valuable as street and park trees.—Lvs. opposite, imparipinnate or rarely simple, usually serrate: fls. polygamous or dioecious, in panicles from terminal or lateral buds, before or with the lvs.; calyx small,

4-toothed or irregularly dissected, or 0; petals 2-6, united in pairs at base, or 0; stamens 2, inserted at base of corolla or hypogynous: fr. a 1-seeded winged samara. (*Frax-inus*: ancient Latin name.)—Some of the native species may be planted, but these should be sought in the regional manuals.

- Fls. with the lvs.; corolla present.....1. *F. Ornus*  
 Fls. before the lvs.; corolla lacking.....  
 Calyx persistent on fr.....2. *F. americana*  
 Calyx lacking.....3. *F. excelsior*

1. **F. Ornus**, L. (*Ornus europæa*, Pers.). Round-headed tree to 25 ft. high, with gray or brownish somewhat downy winter-buds: lvs. 8-10 in. long, of 7-11 ovate, oblong-ovate or lanceolate lfts. 2-3½ in. long, serrate, base of midrib beneath rusty-pubescent: fls. whitish, fragrant, in dense panicles 3-5 in. long, in May-June with the lvs.; calyx 4-parted; petals narrowly linear, acute: fr. linear or lanceolate, about 1 in. long, truncate or emarginate at apex. (*Ornus* is an ancient Greek and Latin name for a mountain ash.) S. Eu., W. Asia.—Varies in shape of lvs. to vars. with lanceolate or roundish-oval lfts.

2. **F. americana**, L. WHITE ASH. Tall tree to 120 ft., with glabrous branchlets and petioles: lvs. 8-15 in. long, of 5-11 ovate or oblong acuminate stalked lfts. 3-5 in. long, entire or serrate, dark green above, pale beneath and the veins often pubescent: fls. dioecious, apetalous, produced in Apr.-June before the lvs.; calyx persistent on fr.: fr. linear-oblong, 1-2 in. long, obtuse or emarginate at apex. E. N. Amer. to Tex.—There are several vars., one having lfts. edged with white.

3. **F. excelsior**, L. Tall tree to 140 ft., with black buds: lvs. 10-12 in. long, of 7-13 ovate, oblong or lanceolate acuminate sessile lfts. 2-5 in. long, serrate, dark green and glabrous above, paler and often pubescent on the veins beneath: fls. in early spring before the lvs., without calyx or corolla: fr. oblong, about 1½ in. long, obtuse, emarginate or acute at apex. Eu., W. Asia.—Runs into many forms such as: of dwarf or pendulous habit; yellow or striped branches; lvs. variegated or blotched with white; lvs. reduced to 1 lft. or with very narrow incisely serrate lfts. *F. rotundifolia*, which is *F. oxycarpa* var. *parvifolia*, Wenzig, is sometimes advertised, but is scarcely distinct; said to have narrower sinuate-dentate lfts. and brown buds.

9. **CHIONANTHUS**, L. FRINGE-TREE. Deciduous shrubs or small trees, of about 3 species in N. Amer. and China, one planted for ornament.—Lvs. opposite, entire: fls. white, bisexual or polygamous, in loose panicles from lateral buds at the ends of branches of previous year; calyx small, 4-lobed, persistent; corolla of 4 linear petals only slightly united at base; stamens 2, rarely 3, short, inserted on corolla: fr. a 1-seeded drupe. (*Chionan-thus*: Greek *snow flower*.)

C. **virginica**, L. Large shrub or slender tree to 30 ft. high: lvs. oval or oblong, 3-8 in. long, acuminate, tapering at base, pubescent beneath when young: fls. about 1 in. long, in drooping panicles 4-6 in. or more long in early summer: drupe ovoid, ½-¾ in. long, dark blue. Pa. to Fla. and Tex.

#### 140. LOGANIACEÆ. LOGANIA FAMILY

Herbs, shrubs, or trees, of more than 30 genera and 400 species in trop. and warm regions of the world, a few cult. as ornamentals.—Lvs. commonly opposite, simple, entire or dentate, stipulate: fls. usually bisexual and regular, mostly in cymes or spikes; calyx with 4-5 imbricated lobes; corolla gamopetalous, with 4-5-parted limb; stamens as many as corolla-lobes and alternate with them, or rarely reduced to 1, inserted on tube or throat of corolla; ovary superior, usually 2-celled with many ovules in each cell, with simple 2-cleft or rarely 4-cleft style: fr. a dehiscent caps. or berry or drupe.—Strychnine is obtained from the seeds of *Strychnos Nux-vomica*, L., an Indian tree to 40 ft., with ovate lvs., fls. in terminal cymes, and many-seeded berries; to be expected in economic collections under glass.

- Plant climbing, glabrous: style 4-cleft.....1. GELSEMIUM  
 Plant erect, with stellate or glandular pubescence: style simple.....2. BUDDLEIA



1. **GELSEMIUM**, Juss. Two glabrous twining shrubs, one native in S. E. U. S., the other in E. Asia, the former cult. as a porch or bank cover and sometimes in greenhouses.—Lvs. opposite or rarely verticillate, the bases connected by a stipular line: fls. showy, very fragrant, in axillary and terminal cymes, the pedicels scaly-bracted; corolla funnellform, 5-lobed; style slender, 4-cleft: fr. an ovoid or oblong caps. septicidally dehiscent by 2 valves at summit, the seeds flattened and winged. (Gelse-mium: from Italian *Gelsomino*, name of the true jessamine.)

**G. sempervirens**, Ait. f. **CAROLINA YELLOW JESSAMINE**. Evergreen vine sometimes climbing to 20 ft.: lvs. lanceolate to ovate-lanceolate, 1-3 in. long, entire, short-petioled: fls. dimorphous, in 1-6-fld. cymes, bright yellow, 1-1½ in. long, blooming throughout the season: caps. flat, ⅓-½ in. long. Va. to Fla., Tex., and Guatemala.

2. **BUDDLEIA**, L. About 70 species of trees or shrubs or rarely herbs, in the tropics and subtropics of Amer., Asia and S. Afr., grown out-of-doors in the S. and in greenhouses.—Plants usually with stellate, glandular or scaly pubescence: lvs. opposite, entire or dentate, the bases mostly connected by a stipular line: fls. in heads, racemes or panicles; corolla campanulate or funnel-form, 4-lobed; style simple: fr. a caps. septicidally dehiscent by 2 valves. (Buddle-ia: after Adam Buddle, English botanist, died 1715.)

Fls. in globular heads.....1. *B. globosa*

Fls. in racemes of panicles.

Lvs. densely white- or yellowish-tomentose beneath.

Tomentum close: fls. lilac with orange eye.

Corolla glabrous or nearly so outside.....2. *B. Davidi*

Corolla densely pubescent outside.....3. *B. officinalis*

Tomentum loose and fluffy: fls. white or orange.

Color of fls. white.....4. *B. asiatica*

Color of fls. orange.....5. *B. madagascariensis*

Lvs. only slightly grayish-tomentose beneath.

Calyx-teeth short and broad; corolla granular-pubescent outside.....6. *B. Lindleyana*

Calyx-teeth longer than wide; corolla densely pubescent outside.....7. *B. japonica*

1. **B. globosa**, Lam. Shrub to 15 ft. high, the branches and under side of lvs. densely yellowish-tomentose: lvs. lanceolate, 5-10 in. long, long-acuminate, tapering at base, round-toothed, dark green and wrinkled above: fls. fragrant, orange, in dense long-peduncled globular heads ¾ in. across, in late spring or early summer. Chile, Peru.

2. **B. Davidi**, Franch. (*B. variabilis*, Hemsl.). Deciduous shrub to 8 ft. or more high: lvs. ovate-lanceolate or lanceolate, 4-10 in. long, acuminate, rounded or tapering at base, very short-petioled, dark green above, densely clothed beneath with close white tomentum: fls. fragrant, lilac with orange-yellow mouth, in small clusters on slender cylindrical panicles 6-12 in. or more long, in late summer; corolla glabrous or only sparingly pubescent outside. (For Armand David, page 327.) China.—Var. **magnifica**, Rehd. & Wils., has very dense panicles and larger rose-purple fls. with deep orange eye, the margins of petals reflexed. In var. **superba**, Rehd. & Wils., the petals are not reflexed and panicles larger than in var. **magnifica**. Var. **Veitchiana**, Rehd., is more robust than type, with gracefully arching branches and denser and larger clusters of mauve-colored fls. with orange eye. Var. **Wilsoni**, Rehd. & Wils., has bright rosy-lilac fls. with orange eye, blooming through Sept.

3. **B. officinalis**, Maxim. To 8 ft. high, with grayish-tomentose branchlets: lvs. oblong to linear-lanceolate, 2-6 in. long, entire or serrulate, grayish-pubescent above, densely clothed below with close white or yellow tomentum: fls. fragrant, lilac with orange eye, in dense clusters forming a terminal panicle 4-6 in. long, blooming in winter in the greenhouse; corolla pubescent outside and within. W. China.

4. **B. asiatica**, Lour. Shrub or small tree, with branches densely tomentose when young: lvs. lanceolate, 4-8 in. long, entire or serrulate, dark green and glabrous above, densely clothed beneath with fluffy white or yellowish tomentum: fls. very fragrant, white, in slender drooping spikes 3-9 in. long, blooming in winter in the greenhouse; corolla villous outside. China, India, Java.

5. *B. madagascariensis*, Lam. Straggling shrub to 20 ft. high, with densely tomentose branchlets: lvs. ovate-oblong, to 5 in. or more long, acuminate, rounded or slightly cordate at base, entire, dark green and glabrous above, densely clothed beneath with fluffy white or yellow tomentum: fls. orange, in large terminal panicles in winter; corolla tomentose outside. Madagascar.—Sometimes called Smoke-Bush.

6. *B. Lindleyana*, Fort. To 6 ft. or more high, with angular or slightly winged branches pubescent when young: lvs. ovate or oblong-lanceolate, 2-4 in. long, acuminate, tapering at base, remotely denticulate, dark green above, pale and slightly pubescent beneath: fls. purplish-violet, in dense erect racemes from 3-12 in. and more long; calyx-teeth short and broad; corolla granular-puberulent outside, slightly curved. (For John Lindley, page 514.) China.

7. *B. japonica*, Hemsl. Closely resembling the preceding but with more broadly-winged branches, the ovate lanceolate lvs. to 8 in. long, racemes pendulous, the calyx-teeth longer than wide, and the lilac corolla densely hairy outside. Japan.

#### 141. GENTIANACEÆ. GENTIAN FAMILY

Annual and perennial herbs or rarely shrubs, of about 70 genera and 750 species of cosmopolitan distribution, but most abundant in temp. regions, only a few species planted for ornament.—Lvs. opposite or rarely alternate or verticillate, entire, exstipulate: fls. regular, bisexual, mostly in axillary or terminal cymes; calyx 4-12-parted, persistent; corolla gamopetalous, the limb 4-5- or rarely 6-12-parted; stamens of same number as corolla-lobes and alternate with them, inserted on throat or tube of corolla, the filaments filiform or dilated at base; hypogynous disk inconspicuous or wanting; ovary superior, mostly 1-celled with 2 parietal placenta and numerous ovules, or 2-celled; style simple with entire or 2-lobed stigma: fr. a caps., mostly septically dehiscent by 2 valves.—Many species of *Gentiana* are cult. as fanciers plants, particularly in Eu., but they are rarely seen in N. Amer. G, Fig. 12, page 570.

Plant an erect terrestrial herb: lvs. opposite.....1. EXACUM  
Plant a floating aquatic herb: lvs. alternate.....2. NYMPHOIDES

1. *EXACUM*, L. About 30 herbaceous species or rarely subshrubby, native in trop. and subtrop. Asia, Malaya, Madagascar, and trop. Afr., one sometimes grown under glass or out-of-doors in warm regions.—Lvs. sessile, clasping or short-petioled: fls. sessile or pedicelled, mostly in forking cymes or sometimes solitary at ends of sts.; calyx 4-5-parted, the lobes keeled, winged or flat and 3-nerved; corolla with short tube and 4 oblong twisted lobes; stamens 4 or 5, attached to mouth of corolla-tube, the filaments short; ovary 2-celled: caps. globose, 2-valved. (Ex-acum: classical name, of no application here.)

Fls. about  $\frac{1}{2}$  in. across.....1. *E. affine*  
Fls. nearly 2 in. across.....2. *E. macranthum*

1. *E. affine*, Balf. Glabrous biennial 1-2 ft. high, much branched from the base: lvs. elliptic-ovate, 1-1 $\frac{1}{2}$  in. long, very broad and 3-5-nerved from base, petioled: fls. bluish, about  $\frac{1}{2}$  in. across; sepals with broad wing on back. Socotra.

2. *E. macranthum*, Arn. Biennial to 2 ft. high, slightly branched: lvs. elliptic-oblong, to 3 in. long, strongly 3-nerved from base, nearly sessile: fls. purplish-blue, 2 in. across, with narrow ring of yellow at throat and yellow stamens; sepals winged. Ceylon.

2. *NYMPHOIDES*, Hill (*Limnanthemum*, S. G. Gmel.). Aquatic floating herbs rooting in the mud, of about 20 species of wide distribution in fresh water.—Lvs. alternate or rarely nearly opposite beneath the fls., ovate or orbicular, deeply cordate or rarely peltate with a closed sinus, the margins entire or slightly wavy: fls. yellow or white, borne in the axils or on filiform sts. apparently from the petioles; calyx deeply 5-parted; corolla nearly rotate, deeply 5-parted, the lobes often fringed; stamens 5, attached at base of corolla;

ovary 1-celled: caps. ovoid or oblong, indehiscent or irregularly dehiscent. (Nymphoides: *Nymphæa*-like.)

Fl.-umbels in the axils of nearly opposite lvs.: margins of lvs. repand. . . . . 1. *N. peltatum*  
 Fl.-umbels borne on the petioles near the top: margins of lvs. entire. . . . . 2. *N. indicum*

1. *N. peltatum*, Britt. & Rend. (*N. nymphæoides*, Britt. *Limnanthemum nymphæoides*, Hoffm. & Link). FLOATING-HEART. Stout branching plant producing runners and spreading rapidly: lvs. ovate-orbicular, 2-4 in. broad, often mottled, margins repand, on long stout petioles which on upper lvs. are dilated near base: fls. bright yellow, 1 in. or more across, on long stout pedicels, in umbels in the axils of nearly opposite lvs.; corolla-segms. short-fringed: seeds with fringe-like margins. Eu., Asia; naturalized in District of Columbia.

2. *N. indicum*, Kuntze (*Limnanthemum indicum*, Thwaites). WATER SNOW-FLAKE. Lvs. orbicular, 2-8 in. across, mostly entire, with a deep basal sinus and long petioles: fls. white, yellowish toward the base within, borne in sessile umbels on petioles near the top; corolla-lobes fimbriated and densely papillose: seeds not fringed. Tropics.

## 142. APOCYNACEÆ. DOGBANE FAMILY

About 130 genera and 1,100 species of herbs, shrubs or trees, often climbing, of wide range but most abundant in trop. regions, several grown for ornament and a few for the edible frs.—Juice milky: lvs. opposite, verticillate or alternate, simple and entire, mostly exstipulate: fls. bisexual, regular, in cymes or panicles or solitary; calyx deeply 5-parted, the lobes imbricated in the bud, persistent; corolla gamopetalous, the 5 lobes convolute and twisted in the bud, the tube often appendaged; stamens as many as corolla-lobes and alternate with them, inserted on tube or mouth of corolla, the filaments commonly free, the anthers usually sagittate and acute, pollen granular; hypogynous disk usually present, entire or lobed, sometimes of 2-5 scales; ovaries mostly 2, superior or partly inferior, or ovary 1- or 2-celled with few to many ovules; style 1, simple or divided: fr. mostly of 2 follicles, sometimes berry-like or drupe-like, the seeds often with a tuft of hairs.

- A. Lvs. alternate.
- B. Calyx with many glands at base: ovules 2 in each cell: fr. fleshy. . . 1. THEVETIA
- BB. Calyx without glands: ovules many in each cell: fr. leathery. . . . 2. PLUMERIA
- AA. Lvs. opposite or whorled.
- B. Habit climbing (at least in ours).
- C. Stamens united around stigma and adherent to it.
- D. Calyx large and lf.-like: stamens with very long filaments. . . 3. BEAUMONTIA
- DD. Calyx small; stamens with short filaments.
- E. Fls. salverform, of medium size. . . . . 4. TRACHELOSPERMUM
- EE. Fls. funnellform, very large.
- F. Disk of 2 scales alternating with the ovaries. . . . . 5. DIPLADENIA
- FF. Disk of 5 lobes or scales. . . . . 6. MANDEVILLA
- CC. Stamens not united. . . . . 7. ALLAMANDA
- BB. Habit upright or trailing, not climbing.
- C. Anthers connivent around the stigma. . . . . 8. NERIUM
- CC. Anthers free.
- D. Fls. solitary in the axils. . . . . 9. VINCA
- DD. Fls. in axillary or terminal cymes.
- E. Plant armed with spines. . . . . 10. CARISSA
- EE. Plant spineless.
- F. Ovaries 2. . . . . 11. TABERNÆMONTANA
- FF. Ovary 1.
- G. Fr. a berry: ovary 2-celled. . . . . 12. ACOKANTHERA
- GG. Fr. a 2-valved caps.: ovary 1-celled. . . . . 7. ALLAMANDA

1. *THEVETIA*, L. Glabrous shrubs or small trees, of about 10 species in trop. Amer., one grown under glass and out-of-doors in the S.—Lvs. alternate, more or less leathery, 1-nerved and pinnately veined: fls. large, yellow, in terminal peduncled cymes; calyx with many glands inside at base; corolla funnellform, with cylindrical tube and campanulate limb, with 5 hairy scales at throat; stamens borne at throat with the scales; disk 0; ovary 2-lobed and 2-celled with 2 ovules in each cell, the style filiform with 2-lobed stigma: fr.

a drupe with thin flesh, broader than long. (Thevetia: after André Thevet, 1502-1590, French monk who traveled in Brazil.)

**T. nereifolia**, Juss. (*Cerbera Thevetia*, L.). Densely leafy evergreen shrub or small tree to 30 ft. high: lvs. linear, 3-6 in. long,  $\frac{1}{4}$  in. or less wide, tapering at both ends, nearly sessile, margins revolute, dark green and shining above: fls. yellow, fragrant, 2-3 in. long, the limb much longer than the tube: drupe compressed-triangular, 1 in. or more across, black. Trop. Amer.

**2. PLUMERIA, L.** Also spelled *Plumiera*. FRANGIPANI. About 50 trop. American species of trees or shrubs, planted for ornament in warm regions.—Branches thick and fleshy: lvs. alternate, petioled, pinnate-veined, the primary veins joined to a nerve running parallel with the margin: fls. large, subtended by large deciduous bracts, in terminal peduncled cymes; calyx small, without glands; corolla funnelform, without scales or hairs at throat; stamens inserted near base of corolla-tube, the anthers obtuse; disk 0; ovary of 2 distinct partly inferior carpels, with many ovules in each cell; style very short with 2-lobed stigma: fr. consisting of 2 leathery follicles. (Plumeria: for Chas. Plumier, 1646-1706, French botanist who traveled in Amer.)

- Fls. pink or red.....1. *P. rubra*  
 Fls. white or yellow.  
     Lvs. linear to linear-oblong, densely white-pubescent beneath.....2. *P. alba*  
     Lvs. oblong, glabrous beneath.....3. *P. acuminata*

**1. P. rubra, L.** Shrub or small tree to 15 ft. high: lvs. elliptic-oblong to elliptic-obovate, up to 16 in. long and 4 in. wide, acute or shortly acuminate, glabrous on both sides: fls. pink to red or purple, very fragrant, 2 in. or more across, in terminal cymes which are shorter than lvs.; corolla-tube shorter than the broadly oval obtuse lobes. Mex. to Venezuela; naturalized in W. Indies.

**2. P. alba, L.** Tree to 35 ft. high: lvs. linear to linear-oblong, to 10 in. long and  $\frac{1}{4}$ - $\frac{1}{2}$  in. wide, obtuse or acuminate, the margins revolute, densely white-pubescent beneath: fls. white, fragrant, 1 in. and more across, the obovate corolla-lobes as long as or longer than tube. W. Indies.

**3. P. acuminata, Ait.** (*P. acutifolia*, Poir.). Tree to 20 ft. high: lvs. oblong, to 16 in. long and 3 in. wide, tapering at both ends, glabrous on both sides: fls. white, yellow at base, very fragrant, the obovate corolla-lobes much longer than tube. Mex.

**3. BEAUMONTIA, Wall.** Four or 5 woody vines from E. India to Java, one grown in the greenhouse and out-of-doors in the S.—Lvs. opposite, pinnate-veined: fls. very large, subtended by lf.-like deciduous bracts, in terminal cymes; calyx large, with leafy acute lobes, with or without glands; corolla funnelform, without scales at throat; stamens inserted in upper part of tube, the filaments very long and dilated above, united around stigma and adherent to it; disk of 5 scales or 5-lobed; ovaries 2, superior, with many ovules in each cell, the style filiform: fr. long-cylindrical, woody, splitting into 2 follicles. (Beaumontia: after Lady Beaumont of Yorkshire, England.)

**B. grandiflora, Wall.** Tall-growing: lvs. elliptic to obovate, 4-8 in. long, abruptly acuminate at apex, short-petioled, glabrous above, slightly pubescent beneath: fls. white, fragrant, 5 in. long; sepals 1-1 $\frac{1}{2}$  in. long; limb of corolla much shorter than tube. Himalayas.

**4. TRACHELOSPERMUM, Lem.** Woody vines of about 16 species from E. India to Japan, one popular in greenhouses and out-of-doors in warm countries.—Lvs. opposite, the veins pinnate and distant: fls. in terminal or axillary loose cymes; calyx small, with 5-10 scales or glands inside at base; corolla salverform, with cylindrical tube and oblong lobes overlapping to the right, without scales in throat; stamens inserted above the middle of the tube, with short broad filaments, anthers united around stigma and adherent to it; disk annular, truncate or 5-lobed; ovaries 2, slightly inferior, with many ovules



in each cell, the style filiform: fr. of 2 elongated terete follicles. (*Trachelospermum*: Greek for *neck and seed*.)

**T. jasminoides**, Lem. (*Rhynchospermum jasminoides*, Lindl.). STAR-JASMINE. Evergreen climbing shrub: lvs. elliptic or ovate-lanceolate, 2-3 in. long, acute or short-acuminate, short-petioled, glabrous or pubescent beneath: fls. white, fragrant,  $\frac{3}{4}$ -1 in. across, in axillary cymes, the peduncles longer than lvs.; calyx-lobes reflexed: follicles 4-7 in. long. China.—**T. divaricatum**, Kanitz, sometimes referred here, is a different species, distinguished by its exserted stamens. Japan.

**5. DIPLADENIA**, A. DC. About 40 species of shrubs at first erect but becoming scandent, native in trop. S. Amer., especially in Brazil, a few grown under glass or in the open far S.—Lvs. opposite, distantly pinnate-veined: fls. large and showy, in terminal or axillary racemes; calyx small, with glands or scales at the base inside; corolla funnelform, without scales at throat; stamens inserted at top of tube which is hairy beneath the stamens, with very short filaments and anthers united around stigma and adherent to it; disk of 2 scales alternating with the 2 distinct superior ovaries which contain many ovules in each cell, the style filiform: fr. of 2 spreading terete follicles. (*Dipladenia*: Greek *double gland*, referring to the disk.)

Fls. white: lvs. acute and petioled at base. .... 1. *D. boliviensis*  
Fls. in shades of rose: lvs. cordate and nearly sessile. .... 2. *D. splendens*

**1. D. boliviensis**, Hook. Glabrous: lvs. oblong, 2-3½ in. long, acuminate, acute at base and petioled, bright green and glossy above, paler beneath: fls. white, the throat yellow inside, 1½ in. across, in axillary 3-4-fld. racemes, the peduncles much shorter than lvs.; corolla-lobes broadly ovate, acuminate, about twice as long as tube. Bolivia.

**2. D. splendens**, DC. St. glabrous: lvs. elliptic, 4-8 in. long, acuminate, cordate at base, nearly sessile, pubescent beneath, margins undulate: fls. white suffused with rose, the throat deeper, almost purple, to 4 in. across, in axillary 4-6-fld. racemes which are longer than the lvs.; cylindrical part of corolla-tube only half as long as remainder; corolla-lobes oval, acutish. Brazil.—There are several names in the trade, as *D. profusa*, *amæna*, *amabilis*, *Brearlayana*, *hybrida*, and *insignis*, which are probably only color-forms of this species or else hybrids of garden origin.

**6. MANDEVILLA**, Lindl. Woody vines native from Mex. to Argentina, of about 50 species, of which one is sometimes grown in the greenhouse or out-of-doors in warm regions.—Differs from *Dipladenia* chiefly in the disk being of 5 lobes or scales: follicles erect or slightly diverging. (*Mandevilla*: Henry John Mandeville, once British minister at Buenos Ayres.)

**M. suaveolens**, Lindl. CHILEAN-JASMINE. Tall climbing vine: lvs. oblong, 3 in. long, acuminate, cordate at base, petioled, glaucous beneath: fls. white or bluish, fragrant, 2 in. across; corolla-lobes nearly as long as tube. Argentina.

**7. ALLAMANDA**, L. About a dozen species of mostly climbing shrubs native in Brazil and 1 to Cent. Amer., grown under glass or in the open far S.—Lvs. whorled or opposite, pinnately veined: fls. large and showy, in lax few-fld. racemes at ends of branches; calyx deeply 5-parted, the outer lobes often larger, with or without glands at base within; corolla campanulate-funnelform, the lower tube cylindrical, with hairs or hairy scales at throat; stamens inserted at mouth of cylindrical tube, filaments very short, anthers not united with stigma; disk annular, entire or 5-lobed; ovary 1-celled with many ovules: fr. a prickly caps. dehiscent by 2 valves. (*Allamanda*: after Dr. Fr. Allamand, professor of natural history in Leyden in the last part of the 18th century.)

Fls. swollen at base. .... 1. *A. neriifolia*  
Fls. not swollen at base. .... 2. *A. cathartica*

**1. A. neriifolia**, Hook. Erect shrub to 3 ft. high or half climbing: lvs. in whorls of 2-5, elliptic or oblong, 3-5 in. long, acuminate, short-petioled, pubescent on the

veins beneath: fls. golden-yellow, 2-3 in. long and the limb  $1\frac{1}{2}$  in. across, striped inside with reddish-brown; tube swollen and greenish at base; corolla-lobes orbicular or oval, obtuse. Brazil.

2. *A. cathartica*, L. Tall-climbing: lvs. in whorls of 3 or 4 or sometimes opposite, obovate, 4-6 in. long, tapering at both ends, very short-petioled, thin, glabrous except on the veins beneath, wavy-margined: fls. golden-yellow marked with white in the throat, 2-3 in. across; corolla-lobes oval. Brazil.—Variable, running into many forms which do not seem sufficiently distinct to be given specific rank. Var. *Hendersoni*, Raffill (*A. Hendersoni*, Bull.), is a glabrous free-flowering form with thick leathery lvs. and fls. 4-5 in. across. (Introduced by Henderson & Co. of England.) Var. *Schottii*, Raffill (*A. Schottii*, Pohl). Young shoots and petioles slightly pubescent: fls. very large, the throat darker yellow and striped. (Named for Heinrich Schott, Austrian botanist who traveled in Brazil in 1817.) Var. *Williamsii*, Hort. Sts. pubescent: lvs. slightly pubescent on both sides, smaller than type: fls. 2-3 in. across, yellow, the throat deeper and stained with reddish-brown. (Grown at Williams' nursery, England.) Var. *grandiflora*, Raffill (*A. grandiflora*, Hook.). Of dwarf compact growth, with thin wiry sts., thin ovate-lanceolate lvs. and lemon- or primrose-yellow fls. 4- $4\frac{1}{2}$  in. across. Var. *nobilis*, Raffill (*A. nobilis*, T. Moore). Pubescent form with purple twigs: fls. bright clear yellow with white spot at base of lobes, 4-5 in. across, with magnolia-like odor.

8. *NERIUM*, L. Three upright shrubs or small trees native from Medit. region to Japan, the oleander commonly cult. in southern countries and as a house plant in the N.—Lvs. usually in whorls of 3, rarely in 4's or opposite, leathery: fls. showy, in terminal branching cymes; calyx with many glands inside near the base; corolla funnelform, tube cylindrical at base, campanulate throat with 5 broad or lacinate teeth, lobes spreading and twisted to right; stamens attached to throat of corolla, included, filaments very short, anthers with long appendages at apex, connivent around the stigma and adherent to it, appendaged also at base; disk 0; ovaries 2, with many ovules in each cell; style filiform: fr. of 2 elongated follicles. (Ne-rium: Greek name of the oleander.)

Lvs. oblong-lanceolate: fls. odorless.....1. *N. Oleander*  
Lvs. linear-lanceolate: fls. sweet-scented.....2. *N. indicum*

1. *N. Oleander*, L. OLEANDER. Evergreen shrub to 20 ft. high: lvs. narrowly oblong-lanceolate, 4-8 in. long, acute or acuminate, tapering at base into short petiole, dark green above, paler beneath with prominent midrib, glabrous: fls. white to red or purple,  $1\frac{1}{2}$ -3 in. across, often double; appendages of corolla 3-4-toothed: pods drooping, 4-7 in. long. (Name refers to the resemblance of the lvs. to the olive.) Medit. region.—There are vars. in which the lvs. are variegated with white or yellow.

2. *N. indicum*, Mill. (*N. odorum*, Soland.). SWEET-SCENTED OLEANDER. Evergreen shrub to 8 ft. high: lvs. linear-lanceolate, 6-10 in. long, revolute at margins: fls. rosy-pink varying to white, often double, 2 in. across, sweet-scented; appendage of corolla lacinate. Persia to Japan.

9. *VINCA*, L. PERIWINKLE. About 12 species of Old World trailing or erect herbs or subshrubs, planted as ground-cover, in window-boxes, or the flower-garden.—Lvs. opposite: fls. rather large, solitary in axils; calyx small, the lobes narrow and acuminate, without glands; corolla salverform, with cylindrical tube and 5 lobes twisted to the left, hairy or thickened at throat; stamens inserted at about middle of tube, included; disk of 2 glands alternating with the 2 distinct ovaries which have 6 to many ovules; style filiform, stigma annular, its apex densely covered with clusters of hairs: fr. of 2 erect or spreading cylindrical follicles. (Vin-ca: old Latin name.)

Plants erect: corolla-tube cylindrical, about 1 in. long.....1. *V. rosea*  
Plants trailing: corolla-tube funnelform, about  $\frac{1}{2}$  in. long.....2. *V. major*

Calyx-lobes ciliate: lvs. truncate or subcordate at base.....2. *V. major*  
Calyx-lobes glabrous: lvs. narrowed at base.....3. *V. minor*

1. *V. rosea*, L. (*Catharanthus roseus*, Don. *Ammocallis rosea*, Small). MADAGASCAR PERIWINKLE. Erect everblooming pubescent herb or subshrub 1-2 ft.

high, grown as an annual: lvs. oblong, 1-3 in. long, rounded and mucronulate at apex, narrowed at base into short petiole: fls. rosy-purple or white, often with a reddish eye, 1-1½ in. across; calyx-lobes linear-subulate, pubescent; corolla-tube slender and cylindrical, about 1 in. long, finely pubescent: follicles about 1 in. long, pubescent. Cosmopolitan in the tropics.

2. *V. major*, L. Trailing evergreen herb, the short flowering sts. ascending: lvs. ovate, 1-2 in. long, obtuse or acutish, truncate or subcordate at base, rather long-petioled, ciliate on margins: fls. blue, 1-2 in. across; calyx-lobes narrowly linear, ciliate; corolla-tube funnelform, about ½ in. long. Eu.—There are kinds in which the lvs. are variegated or margined with yellowish-white.

3. *V. minor*, L. COMMON PERIWINKLE. Commonly called RUNNING-MYRTLE. Trailing evergreen perennial, with erect fl.-sts.: lvs. oblong to ovate, to 1½ in. long, obtuse or acutish, narrowed at base into short petiole, glabrous: fls. lilac-blue (white to dark purple in vars.), ½-¾ in. across; calyx-lobes lanceolate, glabrous; corolla-tube funnelform, ½ in. or less long. Eu.; run wild in E. U. S.—There are vars. with double fls. and lvs. variegated with yellow or white.

10. *CARISSA*, L. (*Arduina*, Mill.). Branching spiny shrubs of about 30 species in the tropics of Afr., Asia and Australia, a few grown in the S. as hedge plants and for the edible frs.—Lvs. opposite, leathery: fls. in few-fl. terminal branching peduncled cymes; calyx glandless or rarely with many glands at the base; corolla salverform, with cylindrical tube and lobes overlapping to right or left, without scales in throat; stamens inserted below top of tube; disk 0; ovary 2-celled with 1-several ovules in each cell; style filiform with shortly 2-lobed stigma: fr. a globose or elliptical berry, sometimes abortively 1-celled. (Caris-sa: aboriginal name.)

Corolla-tube one-half or less as long as lobes.....1. *C. grandiflora*

Corolla-tube about twice as long as lobes.

Tube of corolla about ¼ in. long, densely hairy at throat: berry scarlet, 1-2-seeded.....2. *C. Arduina*

Tube of corolla ¾ in. long, glabrous or puberulous at throat: berry black, 4- or more-seeded.....3. *C. Carandas*

1. *C. grandiflora*, A. DC. (*Arduina grandiflora*, E. Mey.). NATAL-PLUM. Spreading shrub to 18 ft. high, armed with stout bifurcate spines: lvs. ovate, 1-3 in. long, acute, mucronate, rounded at base: fls. white, fragrant, about 2 in. across: corolla-lobes overlapping to left, twice or more longer than tube: berry ovoid to elliptic, 1-2 in. long, scarlet, with firm reddish pulp surrounding the several circular pappy seeds. S. Afr.—Fr. used for jelly and preserves.

2. *C. Arduina*, Lam. (*C. bispinosa*, Desf. *C. acuminata*, DC. *Arduina bispinosa*, L.). Distinguished from the above by its fls. only ½ in. across, the lobes being much shorter than the tube, the minutely ciliate sepals, and the frs. ½ in. long with only 1-2 lanceolate seeds. S. Afr.

3. *C. Carandas*, L. KARANDA. Large shrub or small tree: lvs. oblong to broadly ovate, 1½-3 in. long, obtuse, rounded at base: fls. white or pink, fragrant; sepals ciliate; corolla-tube ¾ in. long, glabrous or puberulous, about twice as long as pubescent lobes: berry elliptic, ½-1 in. long, red but becoming black, with 4 or more seeds. India.

11. *TABERNÆMONTANA*, L. About 160 species of trees or shrubs widely distributed throughout the tropics and a few planted for ornament.—Lvs. opposite, thin or leathery: fls. in branching terminal cymes; calyx usually small, with glands at the base inside; corolla salverform, with cylindrical or seldom dilated tube and lobes twisted to the left, without scales at throat; stamens inserted variously on corolla-tube; disk annular, lobed or 0; ovaries 2 with many ovules; style filiform: fr. of 2 follicles or berries, indehiscent or ventrally dehiscent. (Tabernæmontana: after J. T. Tabernæmontanus, German physician and botanist, died 1590.)

Fls. white; calyx lobed to about middle.

Diam. of fls. 1½-2 in.....1. *T. coronaria*

Diam. of fls. ¾-1 in.....2. *T. citrifolia*

Fls. yellow; calyx lobed nearly to base.....3. *T. grandiflora*

1. *T. coronaria*, Willd. CRAPE-JASMINE. Glabrous shrub to 8 ft. high: lvs. oblong-lanceolate to elliptic, 3-6 in. long, acuminate, short-petioled, thin, bright green above, paler below: fls. white,  $1\frac{1}{2}$ -2 in. across, often double, fragrant; calyx lobed only to about middle; petals crimped on the margin. Native country unknown; cult. in India and in the tropics.

2. *T. citrifolia*, Jacq. Glabrous shrub to 6 ft. high: lvs. oblong or obovate-lanceolate, 3-5 in. long, with acute or bluntish point, attenuate at base into short petiole (*citrus-leaved*, as the name implies): fls. white,  $\frac{3}{4}$ -1 in. across, in terminal compound cymes, the corolla-lobes about as long as tube; calyx lobed to about middle. W. Indies, Mex.

3. *T. grandiflora*, Jacq. Glabrous shrub to 6 ft. high: lvs. oblong-ovate, 2-5 in. long, acuminate, narrowed to short petiole: fls. yellow, about  $1\frac{1}{2}$  in. across, not fragrant; calyx parted almost to base, the lobes leafy; corolla-lobes obovate, obtuse. Venezuela and Guiana.

12. **ACOKANTHERA**, Don (*Toxicophlæa*, Harv.). Three African shrubs or small trees sometimes planted for ornament in warm countries.—Lvs. opposite, thick and leathery: fls. in nearly sessile axillary cymes; calyx without glands, the sepals nearly free; corolla salverform, with cylindrical tube and lobes overlapping to the left, without scales at throat; stamens inserted near mouth of corolla-tube; disk 0; ovary 2-celled with 1 ovule in each cell; style filiform and stigma minutely 2-lobed: fr. a globose or elliptical berry. (*Acokanthe-ra*: Greek, referring to the pointed anthers.)

Lvs. not more than twice as long as broad.....1. *A. venenata*

Lvs. about three times as long as broad.....2. *A. spectabilis*

1. *A. venenata*, Don. Shrub or small tree to 14 ft. high: lvs. mostly ovate or elliptic, to 4 in. long and 2 in. wide, acute and mucronulate or obtuse, narrowed at base into short thick petiole: fls. white to pink, fragrant,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long: berry purplish-black, 1 in. diam. S. Afr.

2. *A. spectabilis*, Hook. f. (*Toxicophlæa spectabilis*, Dyer). Very similar to above but the lvs. longer in proportion to their width, from elliptic to oblong-lanceolate and longer-petioled, fls. longer and berries ellipsoid. S. Afr.

#### 143. ASCLEPIADACEÆ. MILKWEED FAMILY

Herbs, vines, or shrubs, mostly with milky juice, of about 220 genera and 2,000 species of wide geographical range, but most abundant in trop. and subtrop. regions.—Lvs. opposite or sometimes verticillate or alternate, simple and mostly entire, exstipulate: fls. bisexual, regular, in terminal or axillary umbels, cymes or racemes; calyx of 5 nearly or completely free sepals; corolla gamopetalous, hypogynous, 5-lobed or -parted, the segms. usually reflexed; corona mostly present, consisting of a 5-lobed or -parted crown arising from the corolla or stamens; stamens 5, inserted usually near base of corolla and alternating with its lobes, the filaments commonly united into a staminal column, anthers adherent to stigma, the pollen coherent into waxy or granular masses (pollinia), 1 or 2 of these masses in each sac, attached in pairs or 4's to stigma either directly or by arm-like processes; disk 0; ovaries 2, superior, each 1-celled and many-ovuled, the short styles united into a discoid stigma: fr. of 2 follicles, the seeds usually appendaged by a long tuft of hairs.—The essential differences between this family and Apocynaceæ lie in the morphology of stamens and pollen. In Apocynaceæ the stamens are distinct or only lightly cohering, and the pollen is granular; in Asclepiadaceæ the filaments are united, anthers adherent to stigma, and pollen coherent into pollinia. *F*, Fig. 12, page 570.

Plant-body not cactus-like.

Habit upright.....1. **ASCLEPIAS**

Habit climbing (at least in ours).

Cymes terminal (in our species); stamens free, the anthers connected at top.



|  |                 |
|--|-----------------|
| Corolla rotate.....  | 2. PERIPLOCA    |
| Corolla funnelform.....  | 3. CRYPTOSTEGIA |
| Cymes axillary (rarely 1-fld.); stamens united into column.                              |                 |
| Corolla rotate.....  | 4. HOYA         |
| Corolla salverform or funnelform.  |                 |
| Calyx small; anthers unappendaged.....   | 5. CEROPEGIA    |
| Calyx large and leafy; anthers terminated by an erect or in-<br>flexed membrane.         |                 |
| Scales of crown attached to corolla-tube: lvs. (in ours) white<br>and mealy beneath..... | 6. ARAUJIA      |
| Scales of crown attached to back of anthers, free at apex:<br>lvs. green beneath.....    | 7. STEPHANOTIS  |
| Plant-body thick and cactus-like.....  | 8. STAPELIA     |

1. **ASCLEPIAS**, L. MILKWEED. SILKWEED. Perennial herbs, of about 150 species mostly native in Afr. and N. and S. Amer., a few planted in wild-gardens or borders and one sometimes under glass.—Juice milky: lvs. opposite or verticillate, rarely alternate: fls. in terminal or axillary umbels; calyx usually small, often glandular within; corolla deeply 5-parted, the segms. strongly reflexed; crown of 5 erect or spreading hoods which are usually horned within; stamens inserted at base of corolla, filaments united into tube inclosing the stigma, anthers with membranaceous appendage at apex, pollen-masses solitary and pendulous in each anther-sac, attached in pairs to a handle or caudicle which lies in a chink on the side of the stigma; stigma truncate, 5-angled or -lobed: follicles smooth or echinate. (*Asclepias*: ancient Greek name.)

|   |                          |
|---|--------------------------|
| Plant rough-hairy: corolla and hoods orange.....            | 1. <i>A. tuberosa</i>    |
| Plant glabrous or nearly so: corolla red, hoods orange..... | 2. <i>A. curassavica</i> |

1. **A. tuberosa**, L. BUTTERFLY-WEED. PLEURISY-ROOT. Rough-hairy leafy perennial 2-3 ft. high, from long horizontal roots: lvs. alternate, lanceolate or oblong, 2-6 in. long, acute or obtuse, sessile or very short-petioled: fls. about  $\frac{1}{4}$  in. across, in short-peduncled many-fld. umbels; corolla greenish-orange; hoods narrowly oblong, orange or yellow, slightly longer than the filiform horns: follicles finely pubescent, 4-5 in. long, erect on deflexed pedicels. Me. to Fla. and Ariz.

2. **A. curassavica**, L. BLOOD-FLOWER. To 3 ft. high, glabrous or sts. only minutely pubescent above: lvs. opposite, oblong to oblong-lanceolate, 2-6 in. long, mostly acuminate, short-petioled: fls. about  $\frac{1}{4}$  in. across, in terminal or axillary umbels; corolla red-purple; hoods ovate, orange, shorter than the broad curved horns: follicles glabrous or minutely pubescent,  $1\frac{1}{2}$ -4 in. long, erect on erect pedicels. (Named for the Dutch island of Curacoa.) Trop. Amer.; naturalized in S. U. S.

2. **PERIPLOCA**, L. About 12 species of woody twiners native in S. Eu., Asia, and trop. Afr., planted for ornament and hardy in the N.—Juice milky: lvs. opposite, entire: fls. in terminal or axillary cymes; calyx glandular within; corolla rotate; crown adnate to base of corolla, 5- or 10-lobed; stamens with very short free filaments, the anthers connected at apex and villous on back: follicles cylindrical, glabrous. (*Perip-loca*: Greek *around* and *twine*, referring to twining habit.)

**P. græca**, L. SILK-VINE. Deciduous twining glabrous shrub to 40 ft.: lvs. ovate to oblong-lanceolate, 2-5 in. long, acuminate, petioled, dark green and shining above, paler beneath: fls. 1 in. across, brownish-purple inside and greenish outside, in long-peduncled terminal cymes; corolla-lobes oblong, spreading, villous; crown with 5 slender thread-like appendages: follicles to 5 in. long, acuminate. S. Eu., W. Asia.

3. **CRYPTOSTEGIA**, R. Br. Climbing shrubs of probably 3 species in trop. Afr. and Madagascar, sometimes planted for ornament.—Juice milky, often furnishing caoutchouc: lvs. opposite: fls. large, in terminal trichotomous cymes; calyx large, with many glands at base; corolla funnelform, with short tube and campanulate limb; crown of 5 entire or 2-parted scales attached to corolla; stamens with short free filaments and sharply appendaged anthers

connate around stigma: follicles angled or winged. (Cryptostegia: Greek for conceal and cover, referring to the crown.)

- Lvs. glabrous beneath: corolla-segms. entire.....1. *C. grandiflora*  
 Lvs. pubescent beneath: corolla-segms. divided.....2. *C. madagascariensis*

1. *C. grandiflora*, R. Br. Woody strong-growing vine: lvs. oblong, 3-4 in. long, thick and glossy, glabrous: fls. about 2 in. across, purplish, the corolla-lobes entire. Probably African; only cult. in India.

2. *C. madagascariensis*, Bojer. Differs in its red-veined lvs. which are pubescent below, in the pink or whitish fls. which have divided corolla-segms. Madagascar.

4. *HOYA*, R. Br. Nearly 100 species of climbing shrubs native from E. Asia to Australia, one grown as a greenhouse or window-garden subject.—Lvs. opposite, thick: fls. large, in sessile or pedunculate axillary cymes; calyx small, glandular at base within; corolla rotate, fleshy, deeply 5-lobed, the lobes spreading or reflexed; crown of 5 fleshy scales affixed to corolla-tube and spreading into a horizontal star; stamens with filaments united into short tube and anthers connivent above stigma, terminated by an erect or inflexed membrane: follicles glabrous, acuminate. (Hoy-a: for Thomas Hoy, once gardener to the Duke of Northumberland, end of 18th century.)

*H. carnosa*, R. Br. WAX-PLANT. Twining or climbing by means of roots to 8 ft. and more high, glabrous: lvs. ovate-oblong, 2-4 in. long, acute, short-petioled, thick and fleshy: fls. white with pink center, about  $\frac{1}{2}$  in. across, fragrant. China and Australia.

5. *CEROPEGIA*, L. Upright or twining herbs or subshrubs, of more than 160 species in trop. Asia, Afr., and Malaya, one grown as a greenhouse vine.—Lvs. opposite or rarely lacking: fls. in axillary cymes (rarely 1-flid.); calyx small, glandular; corolla tubular, often inflated at base, the lobes free, erect or reflexed, or sometimes variously united at tips; crown attached to the staminal tube, double; stamens with filaments united into short column, the anthers unappended; stigma truncate or shortly conical: follicles lanceolate. (Ceropegia: Greek for wax and fountain, the fls. having a waxy appearance.)

*C. Woodii*, Schlecht. Sts. glabrous, slender, prostrate or trailing, often bearing small tubers and rooting at nodes: lvs. fleshy, broadly ovate or orbicular,  $\frac{1}{4}$ - $\frac{3}{8}$  in. long, acute or obtuse, cordate at base, glabrous: fls. pink or light purple,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, usually 2 together on long peduncles; corolla-tube slightly curved and inflated at base, lobes connate at tips: follicles glabrous, 2-3 in. long. (Bears the name of J. M. Wood, who collected the plant in 1881.) Natal.

6. *ARAUJIA*, Brot. (*Physianthus*, Mart.). Probably about 5 glabrous or mealy climbing shrubs native in Brazil and Argentina, one grown out-of-doors in warm regions or under glass.—Lvs. opposite: fls. in few-flid. peduncled axillary cymes; calyx large and leafy, without glands; corolla salverform or campanulate, the tube inflated at base; crown attached to corolla-tube, of 5 ovate or ligulate scales appressed to the staminal tube; stamens with filaments united in short tube, the anthers terminated by a small inflexed membrane; stigma umbonate: follicles leathery, sometimes inflated. (Araujia: native S. American name.)

*A. sericofera*, Brot. (*Physianthus albens*, Mart.). Lvs. oblong, 2-4 in. long, acuminate, wide and square at base, petioled, dark green above and pale and mealy beneath: fls. white or pale pink,  $\frac{3}{4}$ -1 in. across, not fragrant. S. Brazil.

7. *STEPHANOTIS*, Thou. Climbing glabrous shrubs of about 15 species native in Madagascar and Malaya, one a popular greenhouse vine and also grown out-of-doors in warm countries.—Lvs. opposite, leathery: fls. large, in short-peduncled axillary cymes; calyx large and leafy, without glands; corolla funnelform or salverform, the tube enlarged at base; crown of 5 scales adnate

to anthers on back, free at apex; stamens united into a very short tube, the anthers terminated by an erect or inflexed membrane; stigma conical or shortly beaked: follicles thick, obtuse or acuminate. (Stephano-tis: Greek for *crown* and *ear*, alluding to the 5 ear-like appendages of the crown.)

*S. floribunda*, Brongn. To 15 ft. high: lvs. elliptic, 2-4 in. long, with short abrupt point, petioled, thick and shining: fls. white and waxy, fragrant, 1-2 in. long: follicles fleshy, 3-4 in. long. Madagascar.

8. **STAPELIA**, L. CARRION-FLOWER. Probably about 60 species of African fleshy cactus-like leafless herbs, a number of them grown in collections of succulents.—Sts. thick and fleshy, coarsely 4-angled, the angles often toothed and rarely bearing small lvs.: fls. often large, pedicellate, borne 1 to several together along the sts., usually fetid and barred and mottled with dark or dull colors; corolla rotate or broadly campanulate; crown double, arising from staminal column, the outer usually of 5 entire or divided free lobes, the inner of 5 lobes adnate to base of anthers; stamens with filaments united into very short tube, the unappendaged anthers inflexed on top of style: follicles spindle-shaped, smooth. (Stape-lia: for J. B. Van Stapel, Dutch physician, died 1636.)

*S. variegata*, L. Glabrous, the sts. erect from a decumbent base, 2-6 in. high, very obtusely 4-angled, often mottled all over or tinted with purple at the tips: fls. pale greenish-yellow with dark purple-brown spots, 2-3 in. across, borne 1-5 together at base of young sts.; annulus or ring around the crown very prominent; inner lobes of crown distinctly 2-horned; inner surface of corolla rugose. S. Afr.—Many vars. have been described based on color and form of the fls.

#### 144. CONVOLVULACEÆ. MORNING-GLORY FAMILY

As known to cultivators, mostly twining annual and perennial herbs, but the family comprises many erect herbs as well as shrubs and even trees; the species are probably 1,000, widely spread around the world, particularly in the tropics, in 40-50 genera.—Juice sometimes milky: lvs. alternate, exstipulate, simple or rarely compound, in certain parasitic kinds (the Cuscutas, sometimes placed in a separate family) reduced to scales: fls. regular and usually bisexual, gamopetalous; calyx 5-parted and persistent; corolla mostly funnellform with a flaring limb which is often angled or lobed, usually convolute or twisted in the bud; stamens 5, inserted deep in the tube, alternating with the lobes; ovary superior, 2-celled for the most part and prevailingly with 2 ovules in each cell; styles 1, 2, or 3: fr. mostly capsular, sometimes baccate, often separating into 2-4 carpels.

Stigmas 2, long- or flat-linear, subulate or ovate. . . . . 1. CONVOLVULUS  
Stigma capitate, sometimes shallowly lobed and the parts globose.

Stamens and style exerted.

Corolla white or purple: night-bloomers. . . . . 2. CALONYCTION

Corolla red or yellow; fls. open by day. . . . . 3. QUAMOCLIT

Stamens and style usually not exerted or prominently showing at the throat.

Fls. very large and showy, highly colored. . . . . 4. IPOMŒA

Fls. about  $\frac{1}{4}$  or  $\frac{1}{2}$  in. across, in ours white. . . . . 5. PORANA

1. **CONVOLVULUS**, L. BINDWEED. Annuals or perennials grown mostly in the open for their showy fls. or some for their trailing or twining habit; about 175 species, widely distributed in temp. and trop. regions.—Herbs or sometimes suffruticose, mostly silky-pubescent, twining, trailing, erect, or ascending: lvs. petiolate, entire or seldom lobed or cleft, usually cordate or sagittate: fls. axillary, solitary or loosely cymose, mostly opening only in early morning; corolla campanulate or funnellform, the limb plicate, 5-angled or rarely 5-lobed; stamens inserted near the base of the corolla, equal or un-

equal, the filaments often dilated at base; ovary 2-celled, with 4 ovules; stigmas 2: caps. globose, opening by 4 valves or bursting irregularly. (Convol-vulus: Latin to *entwine*.)

Calyx with 2 membranaceous bracts at base; peduncles usually 1-fld.

Lvs. lanceolate, hastate.....1. *C. japonicus*

Lvs. round-cordate to deltoid-hastate.....2. *C. sepium*

Calyx without bracts; peduncles 1-6-fld.

Corolla blue or violet-purple with lighter or white throat.

Lvs. round-ovate: st. white-villous.....3. *C. mauritanicus*

Lvs. linear-oblong or subspatulate: st. brownish-hairy.....4. *C. tricolor*

Corolla golden-yellow.....5. *C. aureus superbus*

1. *C. japonicus*, Thunb. (*Calystegia pubescens*, Lindl.). CALIFORNIA-ROSE. Herbaceous perennial twiner of vigorous growth, often 20 ft. long, more or less densely and minutely pubescent throughout: lvs. hastate, lanceolate, obtuse or broadly acute, with angular or rounded lobes at base or occasionally without lobes, rarely sharp lanceolate: fl.-stalks 1-fld.; fls. bright pink, 1-2 in. broad, produced freely during the summer months, remaining open for several days; calyx with 2 bracts at base. Japan and E. Asia.—Commonly confounded with *C. sepium*. A completely sterile double form with narrow wavy petals irregularly arranged is now naturalized from S. E. N. Y. to D. C. and Mo.

2. *C. sepium*, L. (*Calystegia sepium*, R. Br.). RUTLAND BEAUTY. Perennial trailer, 3-10 ft. long, glabrous or minutely pubescent: lvs. round-cordate to deltoid-hastate, the basal lobes divaricate, entire or angulate: peduncle 1-fld., exceeding the lvs.; fls. white, rose, or pink, with white stripes; calyx with 2 bracts at base. A very variable species cosmopolitan in temp. regions.

3. *C. mauritanicus*, Boiss. Herb with strong perennial roots: st. slender, prostrate, rarely branched: herbage more or less villous with white hairs: lvs. round-ovate, obtuse, short-petioled; peduncle 1-6-fld.; fls. blue to violet-purple, with a lighter throat, 1-2 in. across, freely produced throughout the summer; calyx without bracts. Afr.

4. *C. tricolor*, L. (*C. minor*, Hort.). Annual, often branching from base and covering a ground space 2 ft. across: st. trailing, ascending, 6-12 in., angulate, brownish-villous: lvs. narrow-oblong or subspatulate, obtuse or rounded at apex, pubescent or sometimes glabrous, ciliate toward base: peduncles 3-fld., usually exceeding the lvs.; calyx without bracts, the sepals ovate, acute, villous; corolla with azure blue limb and yellow throat margined with white. Blooming continuously throughout the summer, the fls. remaining open all day during pleasant weather. S. Eu.—There are vars. with variously striped or spotted fls. and one with white blossoms.

5. *C. aureus superbus*, Hort. Perennial flowering the first season and therefore treated as an annual: st. trailing or twining, 4-5 ft. long: fls. golden-yellow. Botanical position doubtful.

2. CALONYCTION, Choisy. MOONFLOWER. Twining perennial herbs widely cult. for their large night-blooming fls.; 3 or 4 species in trop. Amer.—Lvs. simple, broad, cordate, subreniform, or hastate: fls. white or purple, large and showy, fragrant; sepals 5, the outer ones with horn-like tips; corolla salverform, the limb broad and more or less flat, the tube very long and slender and not dilated at the throat; stamens 5, exserted; pistil with capitate obscurely 2-lobed stigma. (Calonyction: Greek, referring to the beauty of the fls. and their night-blooming habit.)

Fls. white, sometimes with greenish plaits.....1. *C. aculeatum*

Fls. purple.....2. *C. muricatum*

1. *C. aculeatum*, House (*C. speciosum*, Choisy. *Ipomœa Bona-Nox*, L.). Glabrous or nearly so, with milky juice: st. 10-20 ft. high: lvs. cordate to subreniform or hastate, 3-8 in. long, angular or 3-lobed, acute: peduncles 2-6 in. long, 1-7-fld.; fls. fragrant, usually closing in the morning, sometimes remaining open till noon; corolla white, sometimes with greenish plaits, the tube 3-6 in. long, the limb 3-6 in. wide. Tropics, running wild in S. Fla.—Most of the large-fld. and very fragrant kinds in cult. may be referred here.

2. *C. muricatum*, Don (*Convolvulus muricatus*, L. *Calonyction speciosum* var. *muricatum*, Choisy). Fls. purple, smaller than in the preceding, the tube very slender, the expanded portion not over 3 in. broad. Trop. regions.



3. **QUAMOCLIT**, Moench. Twining vines grown for their attractive foliage as well as for the profusion of small bright fls.; about 10 species in the tropics.—Annual or in trop. regions some perennial: lvs. simple or more or less lobed or divided: fls. red or yellow, in long-stalked axillary clusters; sepals 5, equal or nearly so, often very abruptly tipped with long awl-like points; corolla small or medium-sized, the tube somewhat widened above, often slightly contracted below the spreading or cup-shaped limb; stamens exserted and often declined: fr. with false partitions between the seeds. (Quam-oclit: Greek a *dwarf kidney bean*.)—Differs from other Convolvulacæ in its axillary often 2-forked clusters of fls.

- Sepals without awn-like tips: lvs. regularly pinnately divided into nearly thread-like parts.....1. *Q. pennata*  
 Sepals (at least outer ones) with awn-like tips: lvs. entire or variously lobed.  
 Corolla salverform or somewhat funnellform, with a broadly expanding limb.  
 Lvs. deeply parted into 7 or more narrow divisions.....2. *Q. Sloteri*  
 Lvs. entire, angled, or sometimes broadly 3-lobed.....3. *Q. coccinea*  
 Corolla curved and with small scarcely spreading lobes; stamens long-exserted.....4. *Q. lobata*

1. *Q. pennata*, Bojer (*Ipomœa Quamoclit*, L. *Q. vulgaris*, Choisy). CYPRESS-VINE. Glabrous, slender, 10–20 ft. high: lvs. short-petioled or sessile, pinnately divided into long almost filiform segms.: peduncles few-fl., commonly much longer than the lvs.; pedicels thickened; sepals appressed to the corolla-tube, obtuse or slightly mucronate, not long-pointed; corolla 1–1½ in. long, scarlet, the narrowly funnellform tube inflated above, the limb nearly flat, shortly 5-lobed. July–Oct. Naturalized from trop. Amer., Va. to Fla., west to Kans. and Tex.; sparingly escaped from cult. farther north.—There is a white-fl. var.

2. *Q. Sloteri*, House (*Ipomœa Sloteri*, House). CARDINAL CLIMBER. Hybrid of Nos. 1 and 3: free-flowering annual glabrous tall twiner: lvs. broadly deltoid-ovate, 2–4½ in. across, lobed nearly to base and in a semi-palmate way into 7–15 long-acuminate segms. ½–½ in. broad: fls. salverform, crimson or cardinal, with white eye, 1½–2 in. long; outer and sometimes the inner calyx-lobes short-awned. Originated by Logan Slotter, Ohio; introduced by Dreer in 1912.

3. *Q. coccinea*, Moench (*Ipomœa coccinea*, L.). STAR IPOMœA. Glabrous, the st. freely twining for 10 ft., branching: lvs. slender-petioled, ovate, entire, dentate, or angular, cordate, acute or acuminate: peduncles about equaling the lvs. or longer, 2-several-fl.; sepals appressed to the corolla-tube, terminating in a long awn-like point; corolla salverform, the tube ¾–1½ in. long, the cup-like limb ½–¾ in. broad, obscurely lobed, scarlet with yellow throat. Aug.–Oct. Apparently naturalized from trop. Amer., on river banks in the Middle and S. Atlantic states; probably indigenous to New Mex. and Ariz.—Var. *hederifolia*, House (*Mina sanguinea*, Hort.), has 3-lobed or 3-5-parted lvs. and usually larger fls.; another has fls. yellow varying to orange, 1 in. long.

4. *Q. lobata*, House (*Q. Mina*, Don. *Ipomœa versicolor*, Meissn. *Mina lobata*, Llav. & Lex.). Perennial climber, 15–20 ft. high: lvs. cordate with a broad sinus, 3-lobed, the lobes acuminate, the middle one narrowed below: infl. somewhat secund; peduncles stout below, dichotomously several-fl.; sepals tipped with short awn-like points; corolla rich crimson, soon fading to pale yellow, short and tubular below, abruptly widening into a cylindric or bag-shaped limb with 5 small acute lobes; stamens well exserted. July–Sept. Mex.

4. **IPOMœA**, L. IPOMœA. MORNING-GLORY. A genus of various habit but fairly distinct in technical characters of fls. and fr., of 400 or more species as it is here understood, native in many parts of the world and mostly in trop. countries, many of the climbing kinds grown for the very showy fls. and one for its edible tuberous roots; some kinds yield medicinal roots.—Annual and perennial herbaceous twiners, erect herbs, and even shrubs and trees: juice sometimes milky: lvs. alternate, entire, lobed, palmate or pinnate: fls. solitary in the axils or in clusters, in the cult. species large and brilliantly colored; calyx deeply lobed or parted, outer lobes often larger, without bracts;

corolla mostly funnellform to bell-shaped, the limb with 5 points or angles; stigma capitate, sometimes indented or slightly 2-lobed: fr. a dehiscent globose or ovoid caps. (Ipomœa: Greek combination, *worm-bindweed*, of no particular significance.)

- a. Calyx long, with imbricated paper-like lobes or sepals not herbaceous and that enlarge in fr.; anthers twisted; ovary 2-celled. (OPERCULINA.) . . . . . 1. *I. dissecta*
- AA. Calyx with lobes or sepals elongated or at least prominently acute, herbaceous, usually hairy; ovary and caps. 3-celled and 6-seeded. (PHARBITIS.) . . . . . 2. *I. purpurea*
  - B. Sepals acute, appressed: lvs. entire. . . . .
  - BB. Sepals elongated, half or more as long as corolla-tube, erect, spreading or recurved. . . . .
  - C. Tips of sepals long-linear, spreading or recurved; calyx hispid below: lvs. with constricted rounded sinuses broadened at bottom. . . . . 3. *I. hederacea*
  - CC. Tips linear-lanceolate, long-acuminate, little if at all spreading: lvs. without constricted sinuses expanded at bottom. . . . .
  - D. Fls. 1-3 on a peduncle; calyx hirsute. . . . . 4. *I. Nil*
  - DD. Fls. usually 5 or more; calyx hirsute or pubescent. . . . .
  - E. Lvs. glabrate or hispid-pubescent, not canescent. . . . . 5. *I. Leari*
  - EE. Lvs. canescent, silvery or silvery-white beneath, at least when young. . . . . 6. *I. mutabilis*
- AAA. Calyx with lobes or sepals short and thick, not elongated, mostly very obtuse, only rarely somewhat herbaceous or green; ovary 2- or 4-celled. (IPOMŒA proper and BATATAS.) . . . . .
- B. Sts. twining, not rooting: grown for ornament. . . . .
- C. Plant glabrous or essentially so. . . . .
- D. Lvs. unlobed and entire: limb of fl. colored: treated as annual. . . . . 7. *I. tricolor*
- DD. Lvs. unlobed or some of them fiddle-shaped: limb white: deep-rooted perennial. . . . . 8. *I. pandurata*
- DDD. Lvs. digitately narrow-lobed nearly to base. . . . . 9. *I. paniculata*
- DDDD. Lvs. clearly palmately compound. . . . .
- E. Lfts. broad, mostly not exceeding 2 in. long, retuse or apiculate late. . . . . 10. *I. cairica*
- EE. Lfts. rather narrow, 3 in. or more long, sharp-acuminate. . . . . 11. *I. Horsfalliæ*
- CC. Plant setose on sts. and petioles. . . . . 12. *I. setosa*
- BB. Sts. long-trailing and rooting: grown for edible tuberous roots. . . . . 13. *I. Batatas*

1. *I. dissecta*, Pursh. Tall perennial twiner, usually long-villous on sts. and petioles: lvs. digitately 5-7-parted, 2-4 in. across and about the same length, the parts lobed and toothed and acuminate: fls. 1 or 2 on long axillary peduncles, open-funnelform, 1½-2 in. across, nearly white with reddish center; calyx 1 in. or less long, enlarging and containing the big-seeded caps. Ga. and Fla. to Tex., and planted; sometimes called Alamo-Vine.

2. *I. purpurea*, Lam. (*Convolvulus purpureus*, L. *C. major*, Hort.). COMMON MORNING-GLORY. Tall twining annual with hairy sts.: lvs. broadly cordate-ovate, 3-5 in. long, entire, short-pointed: fls. 1-5 on axillary peduncles, the pedicels evident, funnellform, 2-3 in. long, purplish and related colors, with lighter tube; calyx-lobes less than half length of tube, acute but not elongated, not spreading, somewhat exceeding caps. in fr. Trop. Amer., and somewhat spontaneous in our territory; runs into many races in cult., varying in color of fls., with color-marked foliage, and sometimes with double fls.

3. *I. hederacea*, Jacq. (*Convolvulus hederaceus*, L.). Slender twining hairy annual: lvs. cordate-ovate in outline, rather small, 2-3½ in. long, sometimes entire but prevalingly 3-lobed to the middle or beyond (the larger basal lobes sometimes again lobed), the sinuses narrow but broadened and rounded at the bottom: fls. 1-3 and practically sessile on short axillary peduncles, rather small (usually under 2 in. long), funnellform, limb blue or light purple, tube lighter; sepals hairy at base, contracted into a linear projection, spreading or recurving, half or more length of corolla-tube (about ¾ in. long), much exceeding the caps. in fr. Trop. Amer., and frequently run wild; smaller plant than No. 2 and less showy.

4. *I. Nil*, Roth (*Convolvulus Nil*, L.). Often referred to *I. hederacea*, but a stronger and much more showy plant: lvs. larger, commonly shallowly 3-lobed with broad open sinuses (lobes not constricted at base), the apices acuminate: fls. much larger, pedicelled; sepals gradually narrowed, 1 in. or more long, erect or little spreading, not recurved, in fr. much exceeding the caps. (Nil is an Arabic name of the plant.) Old World tropics; also in the western hemisphere, perhaps introduced. —A showy species, with fls. violet, purple, rose, blue, and in many rich markings; some forms have fringed, frilled, fluted, and double fls.; lvs. sometimes spotted and variegated; there are many named hort. forms. The Imperial Japanese morning-glories, often highly developed, belong here. Var. *limbata*, Bailey (*I. limbata*, Hort.), has violet-purple corollas margined white.

5. *I. Leari*, Paxt. BLUE DAWN-FLOWER. Rapid and tall perennial twiner, sometimes woody at base, the sts. finely pubescent: lvs. broad-ovate, 3-8 in. long, acuminate, base cordate or subcordate, entire or sometimes 3-lobed with acute or angular not rounded sinuses, glabrous above, finely pubescent beneath: fls. in capitate clusters of 5 (rarely 3) to many, 3-5 in. broad, bright blue with lighter ribs and plaits but turning rose with age, the tube white below; sepals lance-linear, hairy-pubescent, about 1 in. long. (Bears the name of Mr. Lear, collector in Ceylon, from whom seeds were supposed to have been received in England, but the plant is not known in the Old World and the seeds probably came from Amer.) Trop. and subtrop. Amer.; a handsome and prolific species.

6. *I. mutabilis*, Lindl. Sometimes confused with No. 5, but readily distinguished by its soft grayish-canescient under face of the foliage, the sts. also densely and softly pubescent, tall-twinning and rapid-growing from a perennial woody root: lvs. orbicular-ovate, 4-6 in. long, cordate at base, acuminate, entire or angled or 3-lobed: fls. mostly several in a rather close cluster, 2-3½ in. long, blue or purplish with a white tube; sepals lance-linear, hairy-pubescent, about ¾ in. long. Trop. Amer.

7. *I. tricolor*, Cav. (*I. rubro-cerulea*, Hook.). Tall glabrous twiner, probably perennial, the st. tinged purple: lvs. rather thin and showing prominent veins, broadly cordate-ovate, 3-5 in. long and often broader than long, entire, acuminate, glabrous both surfaces: fls. few to several on thick pedicels and peduncles, 3-4 in. across, purplish-blue with white tube, the limb red before opening; sepals ¼ in. long, hyaline-edged, blunt. Trop. Amer.; showy in cult., running into cultivars, the fls. sometimes dashed and blotched and white; Morning-glory Heavenly Blue belongs here.

8. *I. pandurata*, G. F. W. Mey. WILD SWEET-POTATO VINE. Sts. glabrous, trailing or somewhat climbing from a great tuberous persistent root: lvs. broad-ovate, 2-6 in. long, cordate, acuminate, entire or sometimes pandurate (fiddle-shaped) or angled, glabrous both surfaces: fls. 1-5 on elongating peduncles, 2-4 in. across, white with dark purple throat: seeds woolly. Conn. to Fla. and Tex., often a bad weed; sometimes planted; there is a double-fl. cultivar.

9. *I. paniculata*, R. Br. (*I. digitata*, L.). Stout long-twinning or -trailing glabrous or puberulent vine, probably perennial: lvs. orbicular or reniform in outline, 3-7 in. across, deeply digitately 5-7-parted, sometimes more or less pedate, the sinuses narrow but often somewhat rounded at bottom, lobes narrow and nearly or quite entire and pinnate-veined from the rib: fls. 2 to several, short-pedicelled on a mostly long peduncle; corolla with a rather narrow tube, limb 2-3 in. across, lilac or pinkish; sepals about ½ in. long, broad and rounded. Tropics of both hemispheres.

10. *I. cairica*, Sweet (*I. palmata*, Forsk., not Hort.). Slender twiner, the sts. glabrous and more or less warty, root probably perennial: lvs. 5-palmate, about as broad as long, usually 2-3 in. across; lfts. elliptic to broad-ovate, abruptly tapering to base, retuse or apiculate at apex, margins entire, glabrous both surfaces, pinnate-veined: fls. 1-few, pedicelled, on very short peduncles, about 2-2½ in. long, pale pink, slightly 5-lobed, with prominent plaits; sepals ¼-½ in. long, broad and very obtuse. (Cairica: presumably refers to Cairo, as the plant was early accredited to Egypt.) Tropics, and sometimes running wild in subtrop. regions.

11. *I. Horsfalliæ*, Hook. More or less woody perennial tall glabrous twiner: lvs. of a more or less circular or orbicular-ovate outline, palmate, with 5 or 7 lfts. that are obovate to oblanceolate to elliptic, 3-4 in. long, acuminate, entire, rather thick in texture: fls. many in a forking cluster, pedicelled; corolla narrow-funnel-form, 2-2½ in. long, shining rose or light purple, the limb with prominent plaits and becoming revolute, the stamens short exserted; sepals reddish, nearly ½ in. long, very broad. (Dedicated to Mrs. Charles Horsfall, at whose place it was first raised in England.) American tropics, and perhaps Old-World tropics also.—Var. *Briggsii*, Hort., is a free-blooming kind with magenta-crimson fls. The white-fl. kind may not be of this species.

12. *I. setosa*, Ker. BRAZILIAN MORNING-GLORY. Very vigorous perennial twiner, known by the stiff purplish hairs of sts., petioles and peduncles: lvs. orbicular-ovate in outline and large, 5-10 in. across, vitis-like, deeply cordate, angular or 3-lobed, the middle lobe narrowed at base, margins strongly sinuate-toothed, points all attenuate: fls. 3-9 on fleshy pedicels and peduncles, somewhat salverform, 2-3 in. long, rose-purple; sepals oblong and obtuse, about ½ in. long. Brazil, and elsewhere perhaps introduced.

13. *I. Batatas*, Lam. SWEET-POTATO. Long-trailing perennial (a "Vineless" cultivar) from deep tuberous roots, the sts. mostly thinly-hairy, rooting, juice

milky: lvs. various even on the same plant, mostly ovate to orbicular-ovate in outline, cordate or truncate at base, entire or angled and notched, or digitately lobed: fls. few or several on stout axillary peduncles, funnelform,  $1\frac{1}{2}$ –2 in. long, rose-violet or bluish with a darker center; sepals about  $\frac{1}{2}$  in. long, cuspidate and sometimes ciliate: seeds angular, glabrous. (Batatas or batata is the aboriginal American word from which "potato" is derived.) Cultigen; world tropics, where it flowers abundantly and often fruits, and cult. in temp. regions; it sometimes blooms in the S. U. S.—Much like *I. tiliacea*, Choisy (*I. fastigiata*, Sweet), of the American tropics, from which it is perhaps derived.

5. **PORANA**, Burm. About 15 species of climbing herbs in Old World tropics and N. Australia, one introduced in trop. Amer. and planted in Fla. and perhaps other parts.—Lvs. usually cordate-ovate, entire, alternate, stalked: fls. small, white, blue, or purple, cymose, racemose or paniculate, 5-merous; calyx of similar lobes or sepals, enlarging in fr., much shorter than the campanulate or funnelform corolla; ovary 2-celled, 2–4-ovuled; style 1, capitate or 2-lobed: fr. a small indehiscent or 2-valved oblong caps. (Pora-na: native name.)

**P. paniculata**, Roxb. Profuse, white-pubescent, twining and clambering to 20 and 30 ft.: lvs. cordate-ovate, 3–6 in. long, entire, acuminate, very veiny: fls. many in numerous axillary panicles,  $\frac{1}{2}$  in. or less across, white: caps. globose, hairy. India; sometimes inappropriately called "White Corallita" (see Antigonon, page 248).

#### 145. POLEMONIACEÆ. PHLOX FAMILY

A dozen genera are accepted by the latest monographer, of annual and perennial herbs with a few woody plants, in Eu., Asia, and Amer., mostly in N. Amer., in about 270 species; the family yields many species with ornamental fls.—Lvs. alternate or opposite, simple, pinnate or palmate, exstipulate: fls. bisexual, regular or nearly so, 5-merous as to envelopes and stamens, the latter attached on the corolla and alternate with its lobes, bearing an hypogynous disk; ovary superior, usually 3-celled, with axile placentæ, ovules commonly many in each cell; style 1, mostly 3-fid.: fr. a loculicidal or exceptionally septicidal small caps., with few or many seeds.

Species herbaceous or essentially so.

Plant erect, or not tendril-climbing.

Attachment of stamens at same height, or practically so, on throat or tube of corolla.

Stamens declined in the corolla.

Filaments pilose at base.....1. **POLEMONIUM**

Filaments naked.....2. **LESELLIA**

Stamens not declined (or curved downward) in corolla.....3. **GILIA**

Attachment of stamens unequal (at different heights) in corolla-tube.

Lvs. alternate, often incised or pinnatifid.....4. **COLLOMIA**

Lvs. (at least lower ones) opposite, entire.....5. **PHLOX**

Plant tendril-climbing.....6. **COBÆA**

Species branching shrubs.....7. **CANTUA**

1. **POLEMONIUM**, L. Herbs, with attractive blue, purplish, white, or yellowish fls., 25–30 species, mostly W. N. American, extending into Mex. but also in Eu., Asia, and 2 in S. Amer.—Perennials, rarely annuals or biennials, tall or dwarf, often from a creeping rhizome: herbage often viscid: lvs. alternate, pinnatisect or odd-pinnate: infl. terminal, loosely corymbose or subcapitate; calyx campanulate, 5-cleft, enlarging after anthesis; corolla tubular, funnel-shaped, broadly bell-shaped or subrotate, with obovate lobes; stamens 5, equally inserted, declinate, bearded at base; disk crenate; ovary with 2–12 seeds in each cell: caps. ovoid, 3-valved. (Polemonium: ancient name, not satisfactorily explained.)

Corolla blue or white.

Plant seldom 9 in. high: lvs. mostly near the base.....1. *P. humile*

Plant taller, to 3 ft. high, leafy throughout.

Sts. slender, weak and diffuse.....2. *P. reptans*



- Sts. stout, erect.....3. *P. cæruleum*  
 Corolla yellow and red: st. 2-3 ft. high.....4. *P. flavum*

1. *P. humile*, Willd. (*P. Richardsonii*, Graham, but perhaps not Hort.). About 9 in. high, from thickened somewhat creeping rootstocks: herbage more or less viscid-pubescent: lfts. 15-21, round-oval to oblong, to  $\frac{1}{2}$  in. long: flowering sts. only 1-2-leaved, with rather few fls. in the clusters; corolla blue or purplish, the tube not surpassing the calyx, and much shorter than the rounded lobes. Summer. Arctic regions.

2. *P. reptans*, L. Not over 1 ft. high, slender, weak and diffuse but not creeping: st. leafy, glabrous or pubescent: lfts. 5-15, ovate to lanceolate-oblong: fls. loosely paniculate-corymbose on the branches; calyx-lobes ovate, shorter than the tube; corolla light blue,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long in cult.; stamens not exerted: caps. about 3-seeded. Spring. N. Y. to Ala., west to Minn. and Kans.

3. *P. cæruleum*, L. JACOBS LADDER. GREEK VALERIAN. CHARITY. Glabrous or viscid-pubescent: st. erect, leafy, 1-3 ft. high, hairy or nearly glabrous: basal lvs. forming dense tufts, long petiolate, the lfts. 11-21, lanceolate, mostly acuminate; st.-lvs. smaller, very short-petioled or the upper sessile: fls. blue, many, panicked, drooping, 1 in. or less diam.; calyx campanulate; stamens often somewhat longer than corolla: caps. included in the calyx. Eu.—There is a var. with white fls. and one with variegated foliage.

4. *P. flavum*, Greene. St. 2-3 ft. high, simple or corymbosely branched, leafy, nearly glabrous except at summit: lfts. ovate to oblong-lanceolate: infl. corymbose-cymose, with villous somewhat viscid pedicels; calyx cleft below middle, the lobes triangular-lanceolate; corolla 1 in. long, campanulate-funnelform, yellow within, tawny-red outside, with very short tube and lobes not at all rotate-spreading; stamens and style shorter than the corolla: seeds many in each cell, scarcely winged. Mts. of New Mex.

2. *LCÆSELIA*, L. About a dozen species of herbaceous or somewhat woody plants, from Tex. and Calif. to N. S. Amer., one sometimes cult. under glass and in the open far S.—Lvs. alternate or opposite, spinulose-toothed: fls. red to violet, solitary in the axils or clustered at the ends of the branches; bracts wholly or mainly scarious, spinose-toothed; calyx 5-toothed or -cleft; corolla funnelform, regular or one or two sinuses deeper; filaments inserted below the middle of the corolla-tube; ovary with 2-6 ovules in each cell: caps. short, the seeds winged or margined. (Læse-lia: John Læsel, 1607-1652, Prussian botanist.)

*L. mexicana*, Brand (*L. coccinea*, Don. *Hoitzia coccinea*, Cav.) Glandular-pubescent perennial, more or less woody at base: lvs. 1-2 in. long, stiffish, oval or cuneate-oval to lanceolate, sharply and often spinulose dentate, grayish-green, nearly sessile: fls. brilliant rose-red, tubular-trumpet-shaped, 1 in. long, in terminal fascicles or compound bracted racemes; stamens and 3-lobed stigma exerted; winter bloomer. Mex.

3. *GILIA*, Ruiz & Pav. Herbs or rarely slightly shrubby, several cult. in flower-gardens; a polymorphic genus of more than 100 species, mostly native to W. N. Amer., a few to S. Amer.—Annual, biennial, or perennial: habit, infl. and color of fls. various: lvs. alternate or opposite, entire, toothed, lobed or divided: calyx-teeth of equal length; corolla regular, campanulate to funnelform or salverform; stamens equally inserted on the tube or throat of the corolla, the filaments naked, not declined: caps. 3-celled and 3-valved, 1- to many-seeded, not rupturing the calyx. (Gil-ia: Philipp Salvador Gil, Spanish botanist of the latter half of the 18th century.)—The genus is sometimes broken into several, but this problem is little involved in the species under discussion here.

A. Lvs. normally alternate, entire or pinnately cut or divided (lower lvs. sometimes opposite).

B. Infl. capitate, or the fls. very few.

C. Calyx glabrous or nearly so: heads subglobose.

D. Fls. practically sessile.

DD. Fls. few, pedicelled.

1. *G. capitata*

2. *G. laciniata*

- cc. Calyx more or less woolly; heads flattened..... 3. *G. achilleæfolia*  
 BB. Infl. scattered or loosely corymbose.  
 c. Corolla tubular but small, white and purple; flower-garden annual..... 4. *G. tricolor*  
 cc. Corolla long-tubular and large, scarlet; tall very leafy perennial.... 5. *G. rubra*  
 AA. Lvs. opposite, entire or palmately parted (upper lvs. sometimes alternate).  
 B. Foliage very finely cut into filiform or linear divisions.  
 c. Corolla rotate-campanulate with a short flaring tube..... 6. *G. liniflora*  
 cc. Corolla salverform with a filiform or elongated tube.  
 d. Height 1-2 ft.; corolla-tube about  $\frac{1}{2}$  in. long..... 7. *G. densiflora*  
 dd. Height 8 in. or less; corolla-tube  $\frac{3}{4}$ -1  $\frac{1}{2}$  in. long..... 8. *G. micrantha*  
 BB. Foliage of entire (but narrow) lvs..... 9. *G. dianthoides*  
 AAA. Lvs. alternate, palmatifid into needle-like divisions..... 10. *G. californica*

1. *G. capitata*, Dougl. Erect annual, simple or branching above,  $1\frac{1}{2}$ -2  $\frac{1}{2}$  ft. high, glabrous or nearly so: lvs. 2-3-pinnately divided into very unequal linear segms.: fls. light blue, about  $\frac{1}{2}$  in. long, in dense globose head-like clusters at the ends of long naked peduncles; calyx glabrous or nearly so, with lanceolate teeth; stamens inserted in the sinuses of the corolla. Spring. Calif., Ore., and N.—There is a white-fl. var.

2. *G. laciniata*, Ruiz & Pav. Erect, 6-8 in. high, st. pubescent: lvs. glabrous or nearly so, 2-pinnatisect, the ultimate segms. short and linear: fls. few on short glandular-viscid pedicels; calyx viscid, with nearly subulate teeth; corolla rose, blue, or pale lilac, sometimes white, about  $\frac{1}{2}$  in. long. Peru to Chile and Argentina.

3. *G. achilleæfolia*, Benth. Annual, very similar to *G. capitata* in habit, often nearly simple, usually more pubescent, the fl.-clusters larger and less compact; calyx more or less woolly, with triangular teeth; corolla deep or pale blue, not  $\frac{1}{2}$  in. long. Spring. Calif.—Fls. vary to white or rose and there is a large-fl. sort.

4. *G. tricolor*, Benth. BIRDS EYES. Erect garden annual usually branching and at length diffuse, 1-2  $\frac{1}{2}$  ft. high, more or less glandular-pubescent: lvs. bipinnately dissected into narrowly linear segms.: fls. few or several in loosely corymbose clusters; corolla about  $\frac{1}{2}$  in. long, two to three times as long as calyx, fragrant, with yellowish tube, purple-marked throat and lilac or violet roundish lobes; stamens inserted at the sinuses. W. Calif.—There are many cultivars, with white, rose, or red-violet fls.

5. *G. rubra*, Heller (*G. coronopifolia*, Pers. *Ipomopsis aurantiaca*, I. *elegans* and I. *sanguinea*, Hort.). STANDING- or TREE-CYPRESS. Leafy-stemmed perennial 2-6 ft. high, glabrous or nearly so, unbranched: lvs. pinnately parted into needle-like divisions about 1 in. long: fls. many, showy, inodorous,  $1\frac{1}{2}$  in. long, borne in a long narrow terminal thyrsus or panicle, the calyces inconspicuous among the segms. of the subtending bracts; corolla bright scarlet, within yellowish dotted with red, the ovate lobes somewhat spreading. S. C. south and west.—An old garden plant.

6. *G. liniflora*, Benth. Annual  $\frac{1}{2}$ -1  $\frac{1}{2}$  ft. high, erect or at length diffuse, nearly glabrous: lower lvs. mostly opposite, the upper alternate, all palmately divided into needle-like or spurry-like segms.: fls. paniced, on slender pedicels; corolla white or bluish, nearly rotate, with obtuse lobes. Calif., northward and eastward.

7. *G. densiflora*, Benth. (*Leptosiphon densiflorus*, Benth.). Hairy annual 1-2 ft. high, often strict: lvs. opposite, palmately parted into numerous filiform somewhat rigid divisions: fls. crowded into a leafy-bracteate cluster; calyx-divisions very narrow, little exceeded by the corolla-tube; corolla lilac or nearly white, the tube  $\frac{1}{2}$  in. long, the limb about as long, the lobes spreading, obtuse, often dentate. Calif.—There is a white-fl. var.

8. *G. micrantha*, Steud. Slender somewhat hairy annual not over 8 in. high, the sts. most leafy near the top: lvs. opposite, palmately divided into short narrow segms.: fls. in a leafy-bracteate cluster, the color-range very wide, from purple to lilac, red, yellow, and white; corolla-tube filiform,  $\frac{3}{4}$ -1  $\frac{1}{2}$  in. long, projecting prominently above the upper fascicles of lvs.; corolla-lobes much shorter, spreading and obtuse. Calif.

9. *G. dianthoides*, Endl. (*Fenzlia dianthiflora*, Benth.). Somewhat pubescent annual branching from base, often tufted, 6 in. or less high, compact: lvs. opposite, narrowly linear: fls. profuse, 1-1  $\frac{1}{2}$  in. long, lilac or purple, varying to white, with yellowish throat, the flat-spreading lobes denticulate or nearly fringed. S. and Lower Calif.

10. *G. californica*, Benth. Much-branched perennial, more or less hairy,  $1\frac{1}{2}$ -3 ft., with branches crowded and soon widely spreading, more or less woody at base:

lvs. alternate, palmately 3-7-parted into stiff acerose segms.: fls. rose-colored or lilac, very showy, freely borne; calyx-segms. subulate, mucronate; corolla salverform,  $1\frac{1}{2}$  in. diam. with broadly cuneate lobes. Calif.

4. **COLLOMIA**, Nutt. Nine or 10 herbs sometimes referred to *Gilia*, but the stamens are unequally inserted and usually protruded, the sinuses of the calyx become distended into a revolute lobe and the mature caps. does not rupture the calyx; infl. often subtended by involucre-like bracts; lvs. prevailingly alternate. (Collo-mia: Greek *glue* or *gluten*, the seeds becoming mucilaginous when wet.)

- Lvs. entire.....1. *C. grandiflora*  
Lvs. mostly toothed or cut at the ends.....2. *C. biflora*

1. *C. grandiflora*, Dougl. (*Gilia grandiflora*, Gray). Annual, 1-2½ ft., erect, puberulous: lvs. linear-lanceolate or somewhat broader, 1-2 in. long, entire, the upper ones lance-ovate: fls. about 1 in. long, in close leafy-bracted heads, the corolla buff or salmon-color, narrow funnelform, much projecting beyond the broad and obtuse calyx-lobes. Rocky Mts. to Calif., variable.

2. *C. biflora*, Brand (*C. coccinea*, Lehn.). Very like No. 1, but lvs. mostly narrower and some or all of them toothed or cut near the end, sometimes subopposite near base of st.; calyx-lobes acute and ciliate; corolla scarlet, more or less buff outside. Bolivia, Chile, Argentina.

5. **PHLOX**, L. About 50 annual and perennial temp.-region herbs, sometimes woody at base, with showy fls. of the blue, purple, pink, and crimson series, frequently white, of which one is Siberian and the others N. American. —Sometimes caespitose: lvs. opposite or the upper ones infrequently alternate, entire: fls. cymose, paniculate or thyrsoid; calyx narrow, prominently toothed or lobed, becoming distended and at length burst by the maturing fr.; corolla prominent, strongly convolute, salverform, the tube slender and constricted at the throat, the lobes obovate or orbicular and often retuse or lobed; stamens unequally placed, with short filaments and the anthers mostly included; style commonly filiform: caps. ovoid, 3-valved. (Phlox: Greek *flame*, anciently applied to *Lychnis*.)

- A. The annual flower-garden phloxes: upper lvs. usually alternate..... 1. *P. Drummondii*  
AA. The perennial border and plantation phloxes: lvs. all opposite.  
B. Lvs. subulate and small, crowded: plants forming mats..... 2. *P. subulata*  
BB. Lvs. not so, usually flat, ovate to linear.  
C. Plant strict and tall: fls. very short-pedicelled, disposed mostly in pyramidal or elongated paniculate infl.  
D. Calyx-teeth subulate-setaceous or aristate..... 3. *P. paniculata*  
DD. Calyx-teeth merely acute or pointed.  
E. Sts. purple-spotted: calyx-teeth less than one-third as long as tube..... 4. *P. maculata*  
EE. Sts. not spotted: teeth one-third or one-half as long as tube.... 5. *P. glaberrima*  
CC. Plant low, usually ascending from a more or less decumbent or reclining base: fls. more or less prominently pedicelled, in small clusters (except in No. 10).  
D. Sts. and foliage glabrous or very nearly so..... 6. *P. ovata*  
DD. Sts. and foliage manifestly pubescent or villous.  
E. Sterile shoots from base erect or not prostrate or stoloniferous.  
F. Infl. close, subtended by an involucre of lvs..... 7. *P. amœna*  
FF. Infl. not head-like and subtended, small and more or less crowded.  
G. Height usually 12-18 in. or less: infl. compact; fls. usually bright pink or purplish..... 8. *P. pilosa*  
GG. Height usually 20-30 in.: infl. rather open; fls. very light colored..... 9. *P. argillacea*  
FFF. Infl. not involucre, several in. across, with strong straight ascending branches..... 10. *P. Arendsii*  
EE. Sterile shoots prostrate and usually creeping.  
F. Lower lvs. oblong or ovate..... 11. *P. divaricata*  
FF. Lower or at least sterile shoot lvs. obovate..... 12. *P. stolonifera*

1. *P. Drummondii*, Hook. Much-branched erect villous-glandular annual 6-18 in. tall: lowermost lvs. opposite, others alternate, broad-ovate to oblong and lanceolate, 1-3 in. long, acute and mucronate, narrowed to base or clasping: fls.

showy, rose-red, about 1 in. across, in copious close cymose clusters; calyx-lobes long and narrow, spreading or recurving in fr.; ovule 1 in each cell. Tex., whence seeds were received in England in 1835 from Thos. Drummond.—The common annual phlox of seedsmen, now known in many forms and colors, white, buff, pink, red, purple. The cultivars bear many Latin names. There are dwarf, compact and semi-double forms. Var. *rotundata*, Voss, is a race with petals large and broad, giving the fl. a circular outline. Var. *stellaris*, Voss, the Star Phloxes, is a group with narrow cuspidate often cut and fringed petals.

2. *P. subulata*, L. GROUND- or MOSS-PINK. Tufted spring-blooming perennial, forming mats, at first pubescent: lvs. many and crowded, subulate, mostly  $\frac{1}{2}$  in. or less long but longer on vigorous shoots: fls. many, standing just above the foliage, pedicelled,  $\frac{3}{4}$  in. or more across, pink, purplish, white, the lobes usually obcordate; ovules mostly 1 or 2 in each cell. N. Y. and Mich. to Fla.—Common in cemeteries and gardens, running into named vars. mostly representing color races as *rosea*, *lilacina*, *atropurpurea*, *alba*. Var. *Nelsonii*, Hort., is a compact form with white rose-centered fls.

3. *P. paniculata*, L. SUMMER PERENNIAL PHLOX. Stout and erect, puberulous or glabrous, 2-4 ft. or more high: lvs. thin, veiny, oblong-lanceolate to ovate-lanceolate or sometimes oval-acuminate, 3-5 in. long, pointed, tapering to base, the upper ones sometimes partially clasping: fls. in a large usually pyramidal panicle, in summer and early autumn, pink-purple, about 1 in. or more across, the tube to  $1\frac{1}{2}$  in. long and often pubescent; calyx-lobes setaceous or aristate, prominent. Pa. and Ill. to Fla. and southwest.—The common perennial phlox of gardens, now developed into many colors, white, buff, salmon, rose, scarlet, lilac, magenta, purple. Wild roots transferred to the garden soon bear large panicles and are practically indistinguishable from some of the cult. kinds. *P. decussata*, Hort., is applied both to this and to No. 4.

4. *P. maculata*, L. A lower and more slender plant than No. 3, with purple-spotted st., thickish narrower and less veiny lvs., and calyx-lobes triangular-acute and not bristle-like or aristate. Pa. to Ia. and Fla.—Seldom seen in American gardens, although there are hort. forms of it; perhaps sometimes hybridized with No. 3, but there is only doubtful evidence of this in the modern American summer phloxes.

5. *P. glaberrima*, L. MEADOW PHLOX. Slender and erect wand-like perennial  $1\frac{1}{2}$ -2 ft. high, glabrous: lvs. firm, very narrow, linear or lance-linear, 2-4 in. long and gradually long-pointed, the upper ones sometimes as broad as ovate-lanceolate, midrib prominent but other veins obscure, glossy above, margins more or less revolute: fls. pink or rose-red, short-pedicelled; calyx-teeth very sharp pointed but not aristate, about one-half as long as the calyx-tube, with hyaline margins. Wis. to Ark. and Fla.—In cult. represented mostly by var. *suffruticosa*, Gray (*P. suffruticosa*, Vent.), which is mostly a stiffer and larger plant, more or less pubescent in the infl., and the lvs. broader, often lance-ovate. S. C. south and west; in cult. represented by Miss Lingard and other early-blooming kinds.

6. *P. ovata*, L. (*P. carolina*, L.). Glabrous or only exceptionally with scattered hairs, sts. 10-20 in. high from a decumbent base, perennial: lvs. firm, rather narrowly ovate to oblong-lanceolate, 1-2 in. long, the lower ones on the st. likely to be narrower and tapering into a short petiole, those on the sterile shoots larger, broad-ovate and long-petioled: fls. distinctly pedicelled, in small rather close cluster, bright pink or light red, about 1 in. across, the corolla-lobes rounded; calyx-teeth long-acute but not aristate, one-third to one-half the length of the calyx-tube. Pa. to Ala., mostly in the mts.

7. *P. amœna*, Sims. Pilose perennial, the slender sts. 6-12 in. high from a decumbent base: lvs. oblong-lanceolate or narrower, 1-2 in. long, narrowed at base but sessile, mostly rather blunt, the upper ones forming a ciliate rosette or involucre for the compact infl.: fls. nearly sessile, purplish, pink or white,  $\frac{3}{4}$ -1 in. across, the corolla-lobes usually entire; calyx bristly-hairy, the teeth sharp-acute but not aristate and equaling or exceeding the calyx-tube. Dry lands, Va. to Fla.; spring and early summer.

8. *P. pilosa*, L. Villous, sometimes glandular, perennial, usually  $1-1\frac{1}{2}$  ft. high, the sts. erect or ascending from a more or less tufted base: lvs. linear to lanceolate, 1-3 in. long, divaricate, long-pointed, sessile: fls. in a rather small corymb, pink, purple, or rose, varying to white,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, the corolla-lobes entire; calyx-teeth awn-like, equaling or exceeding the calyx-tube. Dry places, Conn. to Man. and Fla.; spring, earlier than *P. glaberrima*.—Sometimes planted; the garden kind known as *P. pilosa splendens* may belong with No. 10.



9. *P. argillacea*, Clute & Ferris. SILVER PHLOX. A taller plant than *P. pilosa*, forming compact clumps, blooming later and for a longer time, 18–30 in. high, infl. larger and more open, and fls. paler than in the usual range of that species: sts. erect and tufted, hairy: lvs. narrow-lanceolate to linear, long-pointed, sessile, with lvs. inclined to be revolute: corolla-tube 1 in. or more long, purplish, the limb white or sometimes pale lilac and about  $\frac{1}{2}$  in. across, the lobes entire. N. Ind. and Ill., and in cult.

10. *P. Arendsii*, Hort. Cultigen: hybrids between *P. divaricata* and summer perennial phlox, presumably *P. paniculata*: summer-flowering dwarf hardy perennials with wiry pubescent sts. 1–2 ft. high: lvs. lance-ovate to linear-lanceolate,  $2\frac{1}{2}$ –4 in. long, tapering to base and somewhat petiolate, or sometimes broad and partially clasping, long-pointed: fls. in ample broad flattish or somewhat rounded clusters 4–6 in. across, with strong upright branches or rays; corolla about 1 in. across, lavender, mauve, and violet, the lobes rounded or entire although sometimes with narrow lobes like *P. divaricata*: calyx-teeth setaceous and about as long as the calyx-tube.—Exhibited in England in 1912 by Georg Arends, Ronsdorf, Germany, and now grown in this country in such kinds as Elizabeth, Amanda, Katha, Louise. Usually strong upstanding plants suggesting low forms of *P. paniculata*, but sometimes more like *P. divaricata* in stature.

11. *P. divaricata*, L. (*P. canadensis*, Sweet). WILD SWEET WILLIAM. Diffuse spreading perennial with many sterile decumbent and creeping shoots, and variable foliage: sts. erect, 10–18 in. high, viscid-pubescent: lvs. of sterile shoots ovate and sessile; of the flowering sts. oblong to lance-ovate, 1–2 in. long, acute or nearly obtuse, sessile: fls. bluish or pinkish-blue,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. across, pedicelled, in rather open clusters, somewhat fragrant, the lobes entire or obcordate and rather narrow so that they stand well apart; calyx-teeth narrow-subulate, longer than the calyx-tube. Woodlands, Que. and Man. to La. and Fla.; spring.—Var. *Laphamii*, Wood (*P. Laphamii*, Hort.), is a form or state with ovate lvs. and obtuse entire petals, as known in cult. the fls. large and lilac-blue; named after Dr. I. A. Lapham, botanist in Wis., died 1875. There is also a white var.

12. *P. stolonifera*, Sims (*P. reptans*, Michx.). Low and weak glandular-hairy perennial 5–12 in. high, the sterile shoots long and creeping: lvs. on sterile sts. obovate and obtuse, 1–3 in. long and much narrowed at base; those on the erect fl.-sts. 3 or 4 pairs, oval, oblong or lanceolate, about 1 in. or less long, obtuse or only short-acute, the lowest more or less obovate: fls. few in a simple not involucre cyme, purple or violet, about  $\frac{3}{4}$  in. across, the corolla-lobes rounded and usually entire and about one-half length of the tube; calyx-teeth linear-subulate, equaling or exceeding the calyx-tube. Woods, Pa. and Ky. to Ga. and Ala.

6. *COBÆA*, Cav. About 10 species of strong tendril-climbers, one or two species grown in the open and under glass for the large bell-shaped fls.; natives of trop. Amer.—Shrubby plants climbing by lf.-tendrils, but known in cult. as herbs: lvs. alternate, pinnatisect, mostly terminating in a branched tendril: fls. violet to bright green, solitary on long peduncles in the axils; calyx large, 5-parted, the segms. broad and lf.-like; corolla campanulate or broadly cylindric, with 5-lobed limb; stamens exserted, woolly at the place of insertion: caps. leathery, 3-valved, septicidal, the seeds broadly winged. (Cobæa: after Father Cobo, Spanish Jesuit of the 17th century, naturalist and resident of Amer. for many years.)

C. *scandens*, Cav. (*Rosenbergia scandens*, House). Grown commonly as an annual, height 10–25 ft., glabrous, climbing by means of lf.-tendrils: lfts. oval or oblong, in 2 or 3 pairs, the lowest close to the st. and more or less hastate or auriculate, placed like stipules: fls. single on very long peduncles, bearing a great leafy calyx; calyx-segms. elliptic or oblong, mucronate; corolla about 2 in. long, 1– $1\frac{1}{2}$  in. across, light violet or greenish-purple; filaments recurving above the middle: seeds about  $\frac{1}{2}$  in. broad, thin and flat. Mex.—There is a white-fl. kind and one with variegated lvs.

7. *CANTUA*, Juss. A half-dozen shrubs or small trees in S. Amer., one of which is planted in Calif. and sometimes grown under glass for its very showy fls.—Lvs. opposite and simple, often entire, short-stalked or sessile: fls. usually many in rather close terminal clusters, red, violet, or white, the corolla long-tubular with short lobes and much exceeding the calyx; stamens

5, equally inserted at the base of the corolla, included or exserted, the filaments naked; style very slender, often exserted, stigma 3-lobed: caps. loculicidal, 3-valved, many-seeded. (Can-tua: a Peruvian name.)

*C. buxifolia*, Lam. (*C. dependens*, Pers.). Shrub 4–10 ft., the young parts hirsute: lvs. crowded, elliptic or lanceolate, mostly less than 1 in. long, entire: fls. in terminal clusters more or less pendent by the bending of the twigs, pinkish-red with yellow-striped tube; corolla  $2\frac{1}{2}$ –3 in. long, the stamens about equaling the long tube. Peru, Bolivia, N. Chile.

#### 146. HYDROPHYLLACEÆ. WATER-LEAF FAMILY

Herbs, or rarely shrubs, of 18 genera and about 225 species of wide distribution about the world but most abundant in N. Amer., many grown for ornament.—Lvs. alternate or rarely opposite, entire or lobed: fls. bisexual, regular, mostly in terminal or axillary scorpioid cymes, rarely solitary; calyx deeply 5-parted (seldom 10–12 parted); corolla gamopetalous, 5- (rarely 6–10-) lobed; stamens 5 (seldom 6–10), inserted on corolla and alternate with its lobes, the filaments free and filiform; ovary superior, usually 1-celled with 2 placenta and 2 to many ovules, or sometimes 2-celled; styles 2, separate or partly united: fr. a caps. loculicidally dehiscent by 2 valves, rarely septicidally or irregularly dehiscent.

Style 1, more or less 2-cleft.

Calyx with reflexed or spreading appendage in each sinus. . . . . 1. NEMOPHILA

Calyx unappendaged.

Corolla deciduous: fls. blue, purple or white. . . . . 2. PHACELIA

Corolla persistent: fls. yellow. . . . . 3. EMMENANTHE

Styles 2. . . . . 4. WIGANDIA

1. *NEMOPHILA*, Nutt. Diffuse annual herbs of 18 species in N. Amer., often planted in the flower-garden and blooming from early spring to late summer.—More or less pubescent: lvs. opposite or alternate, usually pinnatifid: fls. solitary and peduncled, rarely racemose; calyx 5-parted nearly to base, with a spreading or reflexed appendage in each sinus; corolla campanulate, tubular or rotate, usually longer than calyx, mostly with 10 small appendages at base within; stamens glabrous, included; ovary 1-celled with 2–10 ovules, the style 2-cleft: caps. globose, hairy, loculicidally dehiscent. (*Nemophila*: Greek *grove-loving*.)

Fls. blue or white, marked with brown or purple.

Corolla white, with deep purple spot at tip of each lobe. . . . . 1. *N. maculata*

Corolla blue or white, dotted or veined, but without purple spot at tip

of lobes. . . . . 2. *N. Menziesii*

Fls. pure blue or white, not spotted. . . . . 3. *N. insignis*

1. *N. maculata*, Benth. From 3–12 in. high: lvs. opposite, lyrate-pinnatifid with 5–9 ovate often lobed segms., the upper 3–5-lobed and cuneate at base, or rarely lanceolate and entire: fls. solitary on long axillary peduncles, about 1 in. across; corolla almost rotate, white with deep purple spot at tip of each broad lobe, with broad ciliate nearly free scales. Calif. in Sierra Nevada. —There are forms with variegated lvs. and with pure white fls.

2. *N. Menziesii*, Hook. & Arn. (*N. atomaria*, Fisch. & Mey.). Procumbent annual often nearly glabrous, with straggling succulent sts.: lvs. opposite or lower ones often alternate, pinnatifid into 3–9 lobes: fls. solitary on axillary peduncles longer than lvs.,  $\frac{1}{2}$ –1 in. across; corolla light blue to white, marked with dark brown or purple spots toward the center or sometimes with a dark eye, with narrow or linear scales adherent on one edge, the free edge densely ciliate. (Bears the name of Archibald Menzies, 1754–1842, Scotch surgeon and naturalist.) Calif. to Ore.—There are many garden forms differing in color markings, the best known being var. *discoidalis*, Voss, in which the spots of corolla are confluent into a large brownish-purple eye and only the edges of the lobes are white; and var. *crambeoides*, Hort., with light blue fls. to 1 in. across, veined not spotted with purple.

3. *N. insignis*, Benth. BABY BLUE-EYES. Closely allied to *N. Menziesii* and sometimes united with it, differing in its deep blue or white fls. not being spotted or veined and the hairy scales of the corolla short and broad and partly free. Calif.

2. **PHACELIA**, Juss. More than 100 American species of annual or perennial herbs grown in the flower-garden for the attractive spring and summer bloom.—Lvs. alternate or the lower opposite, simple or compound: fls. in scorpioid cymes or racemes; calyx 5-parted nearly to base, often enlarged in fr.; corolla nearly rotate, campanulate or tubular, soon deciduous, the tube sometimes with appendages within which are free or united with the stamens; ovary 1-celled or falsely 2-celled by the intrusion of the placenta, with 2 to many ovules, the style 2-cleft: caps. 2-valved. (Phace-lia: Greek *cluster*, referring to the crowded fl.-clusters of some species.)

Lvs. simple, dentate.

Stamens without appendages at base: lower lvs. short-petioled.... 1. *P. viscida*

Stamens with a small appendage attached to base of each filament:

lower lvs. long-petioled.

Corolla-tube inflated, three times as long as lobes; appendages

hairy

Corolla-tube not inflated, twice as long as lobes; appendages

glabrous

..... 2. *P. Whittlavia*

Lvs. pinnately dissected.

Corolla-lobes about half as long as tube; appendages entirely ad-

nate

..... 4. *P. tanacetifolia*

Corolla-lobes about length of tube; appendages free at apex..... 5. *P. congesta*

1. **P. viscida**, Torr. (*Eutoca viscida*, Benth.). Annual to 2 ft. high, hirsute below and very glandular above: lvs. ovate, 1-3 in. long, doubly or incisely and irregularly dentate, cuneate or truncate at base, short-petioled or upper lvs. nearly sessile: fls. deep blue with purple or whitish center,  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, in terminal cymes; sepals linear; corolla rotate-campanulate: caps. slightly longer than calyx, abruptly cuspidate. S. Calif.—There is a form with white fls.

2. **P. Whittlavia**, Gray (*Whittlavia grandiflora*, Harv.). CALIFORNIA BLUEBELL. Loosely branching annual to  $1\frac{1}{2}$  ft. high, hirsute and glandular: lvs. ovate, 1-2 in. long, incisely toothed, truncate or cordate at base, the upper lvs. short-stalked, the lower ones with long petioles: fls. blue or purple, about  $\frac{3}{4}$  in. across, with linear sepals and ventricose tube about three times as long as lobes; stamens with hairy appendages at base: caps. about length of calyx. S. Calif.—There is a white-fl. form, and var. *gloxinoides*, Voss (*Whittlavia gloxinoides*, Vilm.), has white fls. with a blue center.

3. **P. campanularia**, Gray. Very similar to *P. Whittlavia* but lvs. less deeply dentate, corolla truly campanulate with scarcely dilated tube about twice as long as lobes, and glabrous appendages. S. Calif.

4. **P. tanacetifolia**, Benth. Erect annual to 3 ft. high, sparsely covered with bristly hairs: lvs. pinnatifid into 9-17 linear-oblong divisions which are 1- or 2-pinnately parted: fls. in dense terminal cymosely clustered spikes, blue or lavender; sepals linear, hirsute with rigid white bristles; corolla-tube about twice as long as lobes; stamens usually long-exserted, with the appendage at its base entirely adnate: seeds reticulated and tuberculate, with an elevated keel on one side. Calif.

5. **P. congesta**, Hook. Very similar and scarcely distinguishable from the former, but the hirsute sepals without bristles, corolla-tube about length of lobes, the stamens not so long-exserted and with the appendage free at apex, and the seeds reticulated. Tex., New Mex.

3. **EMMENANTHE**, Benth. One annual herb native in Calif., sometimes planted in the flower-garden.—Differs from *Phacelia* only in the persistent campanulate corolla which is yellow or cream-colored. (Emmenan-the: Greek for *abide* and *flower*, referring to the persistent corollas.)

**E. penduliflora**, Benth. CALIFORNIA YELLOW- or GOLDEN-BELLS. Branching pubescent and somewhat viscid annual to  $1\frac{1}{2}$  ft. high: lvs. pinnatifid, the ovate segms. entire or dentate: fls. about  $\frac{1}{2}$  in. long, pendulous on long pedicels, in loose racemes paniced toward end of st.; sepals oblong, pubescent; corolla without appendages; stamens included; style 2-cleft at apex, deciduous. Calif.

4. **WIGANDIA**, HBK. Large perennial herbs or subshrubs native in trop. Amer., planted for bold foliage effects.—Lvs. very large, simple and dentate: fls. sessile, in terminal scorpioid cymes; calyx deeply 5-parted at base; corolla

broadly campanulate, without scales inside, the limb large, spreading, 5-lobed; stamens usually exserted and barbed; ovary 1-celled or falsely 2-celled, with very many ovules, the 2 filiform styles with club-shaped capitate stigmas: caps. usually loculicidally dehiscent by 2 valves. (Wigan-dia: after Johannes Wigand, 1523–1587, Prussian bishop and writer on plants.)

**W. caracasana**, HBK. Erect robust subshrub to 9 ft. high, covered with soft yellow or silky pubescence: lvs. ovate, to 1½ ft. long and 1 ft. wide, obtuse, subcordate at base, long-petioled, coarsely and doubly crenate: fls. violet with white tube, ½–¾ in. long. S. Mex. to Venezuela and Colombia (described from the Caracas region, as the name indicates.)—Var. **macrophylla**, Brand, has larger lvs. and white-pubescent infl. *W. Vigieri*, Carr., and *W. imperialis*, Hort., are probably forms of this species.

#### 147. BORAGINACEÆ. BORAGE FAMILY

Mostly herbs, but sometimes woody, yielding a number of ornamentals, of 85 or more genera and some 1,500 species in the temp. regions and tropics of many parts of the world.—In temp. regions the species are herbs or subshrubs, largely rough-hairy and with blue or white fls. in scorpioid racemes or reduced cymes; in the tropics and subtropics they are bushes and small trees, as in *Cordia*: lvs. prevailingly alternate (so in ours), sometimes opposite or verticillate, simple and mostly entire, without stipules: fls. bisexual, usually regular, the calyx and corolla for the most part 5-cleft (sometimes 4-cleft); calyx persistent; corolla often appendaged in the throat; stamens 5, alternate with the corolla-lobes and inserted on the throat or tube; disk usually present; ovary of 2 superior 2-ovuled carpels, often 4-lobed as if of 4 single-ovuled carpels: fr. usually 4 nutlets, each 1-seeded, sometimes 2 nutlets each 2-seeded, sometimes more or less fleshy and berry-like, the nutlets attached to the enlarged or elongated torus (gynobase) by the base or the side; the method of attachment is important in distinguishing genera; the scars show plainly on the dry nutlets or “seeds.” I, Fig. 12, page 570.

- A. Ovary divided into 4 parts that become nutlets in fr., with the simple or seldom 2-lobed style standing in the center between them.
- B. Fls. regular; stamens included, except in No. 1.
- C. Throat of corolla with scales: frs. or nutlets commonly attached at bottom, by their bases.
- D. Corolla rotate; stamens in a cone. . . . . 1. BORAGO
- DD. Corolla tubular or funneliform; stamens usually not forming a cone.
- E. Scales or appendages in throat of corolla broad and blunt.
- F. Racemes prominently bracted. . . . . 2. ANCHUSA
- FF. Racemes without bracts (except sometimes at very base).
- G. Lobes of corolla imbricate (overlapping) in bud. . . . . 3. OMPHALODES
- GG. Lobes convolute (rolled up) in bud. . . . . 4. MYOSOTIS
- EE. Scales in throat linear-subulate. . . . . 5. SYMPHYTUM
- CC. Throat of corolla (at least in ours) naked or with tufts of hair: frs. usually attached by the side.
- D. Calyx large and tubular, with linear lobes cut not below middle. . . . . 6. PULMONARIA
- DD. Calyx short and open, with blunt lobes cut deeply. . . . . 7. MERTENSIA
- BB. Fls. irregular; stamens exserted. . . . . 8. ECHINUM
- AA. Ovary divided into 2 parts, each part 2-celled, with undivided style between them: throat of corolla naked. . . . . 9. CERINTHE
- AAA. Ovary undivided or only lobed, the style terminal.
- B. Style entire. . . . . 10. HELIOTROPIMUM
- BB. Style 4-lobed or -parted. . . . . 11. CORDIA

1. **BORAGO**, L. Annual or perennial herbs, in all 3 species, native to the Medit. region, one introduced into other countries and cult. for its fls. or used as a pot-herb and sometimes with salads.—Erect strigose-hispid plants with alternate lvs. and loose leafy cymes of blue fls. on long pedicels: calyx 5-parted into linear segms.; corolla rotate or campanulate, with short tube and 5 acute lobes, the throat with scales or hairy crests; stamens 5, attached near the base of the corolla, exserted or included, anthers linear; ovary distinctly



4-lobed; style filiform, stigma subentire: nutlets 4, ovoid or oblong, erect, smooth or muricate, attached by the base. (Bora-go: Late Latin *burra*, rough hair, alluding to the foliage.)

**B. officinalis**, L. Coarse hairy annual  $1\frac{1}{2}$ –2 ft. high: lvs. oblong or ovate, narrowed to a margined or broadly winged petiole or sessile, the larger often 4–6 in. long: corolla rotate, about  $\frac{3}{4}$  in. across; stamens exserted, together forming a cone  $\frac{1}{4}$  in. high. Eu., N. Afr.—Mostly known in this country as a bee-plant and for its blue or purplish fls. which bloom throughout the season.

**2. ANCHUSA**, L. ALKANET. Annual or perennial herbs of the Old World, a few cult. for their showy fls.; 30 or 40 species.—Hispid or villous plants with alternate lvs. and paniced mostly leafy-bracteate scorpioid cymes or racemes with elongate branches: fls. blue, violet, or white, seldom yellow; calyx 5-cleft or -parted into narrow lobes; corolla trumpet-shaped, the throat closed by scales, the 5 lobes obtuse; stamens inserted at the middle of the corolla-tube, included, the filaments short: nutlets attached at base. (Anchu-sa: Greek *anchousa*, a paint for the skin.)

Basal lvs. cordate or reniform at base ..... 1. *A. myosotidiflora*  
Basal lvs. not as above.

Fls. small, like forget-me-nots,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam.: plant 1–2 ft. high.

Corolla bright blue or purple ..... 2. *A. officinalis*

Corolla red-margined, with a white throat ..... 3. *A. capensis*

Fls. large,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., bright blue: plant 3–5 ft. high ..... 4. *A. azurea*

**1. A. myosotidiflora**, Lehm. Somewhat hispid perennial branched from base,  $1\frac{1}{2}$  ft. high, the sts. slender and leafy: basal lvs. long-petioled, ovate, cordate or reniform at base, short-acuminate; lower st.-lvs. similar but smaller and with shorter petioles; upper st.-lvs. narrower, tapering to a short petiole or sessile base: fls. small,  $\frac{1}{8}$ – $\frac{1}{4}$  in. across, blue, long-pedicelled, in paniced racemes, blooming in summer. Siberia, Caucasus.

**2. A. officinalis**, L. Hairy biennial or perennial 1–2 ft. high: lvs. lanceolate, sessile, 3–6 in. long, the basal ones clustered: fls. bright blue or purple,  $\frac{1}{8}$ – $\frac{1}{4}$  in. diam., sometimes flesh-colored, in loose one-sided racemes, opening in pairs, blooming in summer and autumn. Eu.

**3. A. capensis**, Thunb. Biennial  $1\frac{1}{2}$  ft. high: lvs. narrowly lanceolate and less hispid than in *A. azurea*: buds red; fls. red-margined with a white throat, about  $\frac{1}{4}$  in. across; calyx inflated after the fl. has withered, the divisions short-obtuse. Summer and autumn. Cape of Good Hope.—A var. has white fls.

**4. A. azurea**, Mill. (*A. italica*, Retz.). Hispid perennial 3–5 ft. high: lvs. oblong- or ovate-lanceolate to broad-lanceolate, 2–6 in. and more long, with broad sessile or somewhat clasping base, or the basal narrowed to a winged petiole: fls. bright blue,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, blooming in summer and autumn; calyx-segms. long and narrow, acute or acuminate. Medit. region.—Purple or dark blue fls. occur in vars.

**3. OMPHALODES**, Moench. NAVELWORT. Low-growing herbs, resembling the forget-me-not, a few sometimes grown in flower-gardens; about 24 species native to the Medit. region, Cent. Asia, and Japan, also in Mex. and sparingly in W. U. S.; this group is variously understood by botanists.—Annual or perennial herbs, glabrous or minutely hairy: basal lvs. long-petioled, the st.-lvs. few and alternate: racemes loose, without bracts or at base leafy-bracteate; fls. white or blue, usually long-stalked; calyx 5-parted, enlarging in fr.; corolla-tube very short, with blunt scales in throat, the 5 broad obtuse lobes imbricated; stamens 5, inserted on the corolla-tube, included; ovary 4-lobed: nutlets with smooth or toothed and inturred border, depressed, with nearly horizontal seeds, in this differing from *Myosotis*. (Omphalo-des: Greek *navel-shaped*, referring to the seeds.)

Plant annual, erect: st.-lvs. linear-lanceolate ..... 1. *O. linifolia*  
Plant perennial, creeping by stolons: st.-lvs. ovate or ovate-lanceolate ..... 2. *O. verna*

**1. O. linifolia**, Moench (*Cynoglossum linifolium*, Hort.). Erect annual 1 ft. high, glabrous and slightly glaucous: basal lvs. spatulate or oblong-spatulate,

slender-petioled; st.-lvs. linear-lanceolate, remotely ciliate, 1-2½ in. long, sessile: fls. long-pedicelled, blooming in summer and autumn; corolla white, twice as long as calyx: nutlets with toothed inflexed margin. Spain and Portugal.—A var. has bluish fls. sometimes tinged with rose.

2. *O. verna*, Moench. CREEPING FORGET-ME-NOT. Stoloniferous perennial pubescent with long soft hairs, the slender ascending fl.-sts. 4-6 in. high: lvs. ovate to ovate-lanceolate, the basal long-petioled, the st.-lvs. few and short-petioled, all with acuminate callous-tipped apex: fls. blue, few, borne on long pedicels in a raceme, blooming in spring. Eu.—A white-fl. var. is offered.

4. *MYOSOTIS*, L. FORGET-ME-NOT. Low annual or perennial herbs widely grown for their clusters of dainty blue, pink, or white fls.; 30-40 species inhabiting both the north and south temp. zones, the cult. forms coming mainly from Eu.—Plants branching, diffuse or erect, more or less hairy: lvs. alternate, entire: fls. blue, rose, or white, in simple or branched terminal racemes, without bracts; calyx small, 5-cleft; corolla salverform, the 5 lobes convolute in the bud, the throat usually crested; stamens 5, included; ovary of 4 almost separate lobes, in fr. forming 4 smooth shining nutlets attached by their bases. (Myoso-tis: Greek signifying *mouse-ear*, from the lvs.)—The common garden forget-me-nots are of the first three species here described.

- Lobes of calyx broad and short, much less than half the length of calyx-tube; calyx with appressed hairs.....1. *M. scorpioides*
- Lobes of calyx sharp and narrow, half or more the length of tube; calyx with prominently divergent hairs.
- Lvs. large, often 3-4 in. long, lower ones broadly oblanceolate and distinctly petioled: calyx almost bur-like.....2. *M. azorica*
- Lvs. smaller, mostly lanceolate to oblong and not or scarcely petioled.
- Calyx with only lower hairs hooked: corolla about ¼ in. across, opening flat.....3. *M. sylvatica*
- Calyx with many or most of the hairs hooked: corolla about ½ in. across, concave.....4. *M. arvensis*

1. *M. scorpioides*, L. (*M. palustris*, Lam.). TRUE FORGET-ME-NOT of Eu. Sts. from slender stolon-like rootstocks, decumbent and rooting below, pubescent or nearly glabrous, 6-18 in. long: lvs. oblong-lanceolate or oblanceolate, nearly sessile: raceme loosely fld., pedicels in fr. much larger than the calyx, spreading; calyx with hairs all straight and appressed, the calyx-lobes deltoid, acutish, much shorter than the tube; corolla ¼ in. or more across with flat limb, bright blue with yellow eye or pink or white: nutlets sessile, margined. Eu., Asia; introduced.

2. *M. azorica*, H. C. Wats. Coarse perennial with decumbent base, 12-18 in. high, the lower part of the st. with prominent retrorse white hairs: lvs. large, the lower ones 3-4 in. long, broadly oblanceolate and rounded at apex, narrowed into petiole, the upper st.-lvs. oblong and sessile but usually ½ in. or more broad: racemes dense in anthesis and more or less secund; calyx usually unequally lobed, and covered with strong setose hairs much like a little bur; corolla blue, about ¼ in. across, with whitish eye. Azores, Canaries, Algeria.

3. *M. sylvatica*, Hoffm. Erect annual or biennial, 1-2 ft. high, hirsute-pubescent, green or cinereous, profusely branched from base: lvs. oblong-linear or oblanceolate, nearly sessile, obtuse or acutish: racemes long and loose; pedicels ascending, usually much longer than calyx; calyx deeply cleft, hirsute, the lower hairs spreading and hooked, the upper erect and straight; corolla ¼-½ in. broad, blue with a yellow eye, or, in some vars., pink or white: nutlets more or less margined and carinate ventrally, sessile. Eu., N. Asia.—Grown under many names, as *Alpestris*, *Dissitiflora*, *Distinction*, *Perfection*, *Robusta Grandiflora*, *Victoria*, *White Gem*, and others.

4. *M. arvensis*, Lam. Erect branched annual or biennial, 6-18 in., hirsute-pubescent: lvs. sessile, 1 in. long more or less, oblong or oblong-lanceolate, mostly short-acute: raceme open-fld.; calyx deeply parted, the hairs rather coarse and most or many of them hooked; corolla ¼-½ in. across, concave, white or blue. Eu., Asia, E. N. Amer.; to be looked for in gardens.

5. *SYMPHYTUM*, L. COMFREY. About 25 species of erect often hispid herbs, sometimes grown for the variegated foliage in certain vars., native in Eu., N. Afr., and W. Asia.—Roots sometimes tuberous: lvs. basal or alternate or the upper occasionally nearly opposite; st.-lvs. often decurrent: fls. in

scorpioid often branching racemes or in terminal cymes; calyx 5-cleft or 5-parted into linear segms.; corolla broadly tubular, almost campanulate above the insertion of the stamens, the throat with 5 lanceolate or linear scales, the 5 lobes very short; ovary 4-lobed; nutlets 4, obliquely ovoid, erect, rugose. (Sym-phytum: Greek *to grow together*, in reference to the supposed healing virtues.)

Lvs. decurrent on the st. .... 1. *S. officinale*  
 Lvs. not decurrent on the st. .... 2. *S. asperum*

1. *S. officinale*, L. Hispid branching perennial about 3 ft. high, with thick root: lvs. 3-6 in. long, the basal and lower cauline oblong-ovate, the upper oblong-lanceolate, all decurrent at base and acuminate: fls. white, yellowish, purple, or rose, long-pedicelled, about  $\frac{1}{2}$  in. long, in drooping scorpioid racemes. Eu., Asia.—Vars. are offered in the trade with variegated lvs. or with scarlet fls.

2. *S. asperum*, Lepech. (*S. asperrimum*, Donn). PRICKLY COMFREY. Branching perennial  $2\frac{1}{2}$ -5 ft. high or more, with thick root: st. rough with retrorse prickles: lvs. hispid-prickly on both surfaces, petioled, ovate or elliptic, acuminate, the lower cordate or rounded at base: fls. at first rose then blue, smaller than those of *S. officinale*. Russia, Caucasus, Persia.—There are hort. forms with yellow-variegated or -margined lvs.

6. *PULMONARIA*, L. LUNGWORT. Perennial herbs of about 8-10 species in Eu., and 1 species said to extend into N. Asia; a few species grown in flower-gardens.—Rootstock creeping: basal lvs. long-stalked and often broad; cauline lvs. few and alternate: fls. rather large, blue or purplish, in terminal forked cymes, the lower or almost all bracteate; calyx tubular-campanulate, 5-toothed or -cleft to the middle, enlarging in fr.; corolla with cylindric tube and 5 obtuse lobes, the throat with 5 tufts of hair instead of scales; stamens included in the corolla-tube: nutlets 4. (*Pulmonaria*: Latin *lung*; one species having been regarded as a remedy for diseases of the lungs.)

Lvs. white-spotted, ovate or cordate.

Basal lvs. acuminate at both ends .... 1. *P. saccharata*

Basal lvs. obtuse at base .... 2. *P. officinalis*

Lvs. entirely green, linear- to oblong-lanceolate .... 3. *P. angustifolia*

1. *P. saccharata*, Mill. BETHLEHEM-SAGE. Plant 6-18 in. high, with setose-hairy sts. having few articulate glands: lvs. white-spotted, the basal oval, acuminate at both ends, slightly decurrent into the petiole at base, the cauline lvs. ovate-oblong and sessile: fls. whitish or reddish-violet, blooming in spring. Eu.

2. *P. officinalis*, L. (*P. maculata*, F. G. Dietr.). St. setose-hairy, with few articulate glands, 6-12 in. high, basal lvs. ovate-oblong to nearly linear, obtuse at base, more or less white-spotted, coarsely hairy, on long stalks, in distinct tufts; cauline lvs. sessile, ovate-oblong: fls. red fading to violet, opening in spring. Eu.

3. *P. angustifolia*, L. St. setose-hairy with few glands, 6-12 in. high: lvs. green, the basal linear-lanceolate to oblong-lanceolate, gradually tapering to and decurrent on petiole; cauline lvs. few, semi-amplexicaul: fls. blue, opening in spring. Eu.—There is a var. *azurea*, Hort.

7. *MERTENSIA*, Roth. Perennial herbs with showy clusters of fls., used in borders; species probably 40, in cooler parts of the northern hemisphere, a good part in N. Amer.—Plants glabrous or hairy: lvs. alternate, often with pellucid dots: fls. blue or purplish, rarely white, more or less drooping, pedicelled and without bracts, the terminal racemes or loosely branching few-fl. cymes unilateral and often paniced; calyx 5-cleft or -parted, with ovate-lanceolate or linear lobes, unchanging in fr.; corolla-tube cylindric below, expanded and more or less campanulate above, the 5 lobes short and broad, the throat naked or with folds or rarely with scales; stamens included or exerted, attached at or above the middle of the corolla-tube: nutlets 4, erect and more or less wrinkled. (*Mertensia*: after Franz Carl Mertens, 1764-1831, German botanist.)—Various native species have been offered by dealers, but only one appears to any extent in cult.

**M. virginica**, DC. VIRGINIA-COWSLIP. BLUEBELLS. Smooth and glabrous, 1-2 ft. high, with erect st.: basal lvs. large, elliptic or rotund, obtuse, long-stalked; st.-lvs. obovate or oblong, acute, decurrent on the short petioles or subsessile; fls. in more or less nodding clusters, blooming in early spring; corolla trumpet-shaped, about 1 in. long, with purple tube and blue bell, the lobes not prominent; filaments much longer than the anthers. N. Y. and westward, to S. C. and Tenn.—A var. has pink fls.

8. **ECHIUM**, L. VIPERS BUGLOSS. Some 30-40 herbaceous or shrubby species from the Canaries and Madeira to W. Asia, a few grown out-of-doors or in the greenhouse.—Plants usually scabrous, hispid or canescent: lvs. alternate: fls. in scorpioid simple or forked spikes, with bracts small or foliaceous; calyx with 5 narrow lobes; corolla tubular-trumpet-shaped, the throat oblique and dilated, without appendages; corolla-lobes 5, roundish, unequal, somewhat spreading or erect; stamens 5, inserted below the middle of the corolla-tube, unequal and exserted; ovary deeply 4-lobed: fr. of 4 nutlets, erect, wrinkled. (E-chium: from the Greek for a viper.)—The hort. species are not well understood botanically.

Plant herbaceous, more or less hispid with stiffish white hairs: infl. a loose panicle of coiled racemes.

Stamens little exserted, not exceeding the longer corolla-lobes.....1. *E. plantagineum*

Stamens far-exserted from corolla.....2. *E. vulgare*

Plant more or less shrubby, not at all hispid: infl. a long narrow spike or thyrs composed of coiled racemes or spikelets.

Fls. deep blue or purple: plant more or less hirsute.....3. *E. fastuosum*

Fls. white or blue with white lines: plant with short appressed often silky pubescence.

Corolla exserted at least half its length: fls. pedicelled.....4. *E. giganteum*

Corolla exserted barely half its length: fls. sessile or nearly so.....5. *E. candicans*

1. **E. plantagineum**, L. Erect or somewhat diffuse herb subsimple and hispid-villous with long white hairs: lvs. obtuse, appressed-hairy, the basal oval and attenuate to a petiole, the cauline oblong-lanceolate: fls. in elongate paniculately disposed one-sided racemes; bracts linear-lanceolate, dilated at base, about equaling the calyx; calyx-lobes elongate, linear-lanceolate; corolla violet,  $\frac{1}{4}$  in. long, nearly twice as long as the calyx, the lobes unequal; stamens about equaling the longer corolla-lobes. S. Eu.

2. **E. vulgare**, L. BLUE-WEED. Bristly-hairy biennial herb, with erect much-branched sts. 1-2 $\frac{1}{2}$  ft. high: lvs. oblong to linear-lanceolate, 2-6 in. long, obtuse or acute, sessile, or the lower and basal ones attenuate into petioles: fl.-buds pink; fls. bright blue to violet-purple,  $\frac{1}{8}$  in. long, many on short one-sided racemes forming a narrow thyrs; segms. of calyx much shorter than corolla; limb of corolla oblique, the lobes very unequal; stamens long-exserted. Eu., Asia.

3. **E. fastuosum**, Jacq. Shrubby branching plant 3-6 ft. high, grayish-hirsute with soft hairs: lvs. lanceolate, acuminate, nervose: infl. cylindric and spike-like, about 6 in. long and 2 in. wide, consisting of numerous densely-fl. coiled one-sided spikelets; buds pink; fls. purple or dark blue, about  $\frac{1}{2}$  in. long; stamens red, long-exserted. Eu. coast, Canaries.

4. **E. giganteum**, L. Shrubby and branching, 6-10 ft. high, whitish with short fine hairs: lvs. lanceolate, acuminate, subattenuate at base into a petiole, whitish with silky appressed hairs, the basal lvs. becoming 1 $\frac{1}{2}$  ft. long: fls. in forked one-sided scorpioid racemes aggregated in a dense thyrsoid panicle; corolla white, somewhat irregular, about twice as long as the calyx; stamens strongly exserted. Tenerife.

5. **E. candicans**, L. f. Shrubby and branching, 4-6 ft. high, grayish with closely appressed hairs and also with more or less fine tomentum: lvs. lanceolate, acuminate, nervose: infl. a long spike, dense or somewhat lax, composed of very many one-sided densely-fl. scorpioid spikelets; corolla white or blue with white lines, exserted barely half its length; stamens well exserted. Madeira, Canaries.

9. **CERINTHE**, L. Herbs of about 6 species from Eu. and Asia Minor, one cult. for its showy purple bracts.—Annual or perennial, glabrous or tuberculate-punctate, often glaucous: lvs. alternate, the cauline cordate or sagittate-clasping at base: fls. yellow, often purple-spotted, in terminal leafy-bracteate



scorpioid racemes or cymes; calyx with 5 lanceolate or ovate lobes; corolla broadly tubular, straight or incurved, the throat naked within, the 5 lobes acute; stamens included or slightly exserted; ovary 2-lobed: nutlets 2, erect. (Cerin-the: Greek *wax* and *flower*; the ancients thought that the bees visited the fls. for wax.)

*C. retorta*, Sibth. & Sm. HONEYWORT. Plant 1½–2 ft. high: lvs. glaucous, often spotted white or red, the lower obovate-spatulate, the upper clasping with 2 round ears at base, the uppermost smaller and passing into purple bracts: mature fls. protruded beyond the bracts, the tubular-club-shaped corolla yellow, purple-tipped, with 5 small spreading teeth: fr. smooth but not shining. Greece.

10. **HELIOTROPIUM**, L. Herbs or sometimes shrubs, widely grown in borders and greenhouses for the fragrant fls.; upwards of 250 species in warm regions.—More or less villous or scabrous, seldom glabrous: lvs. alternate or rarely nearly opposite: fls. small, borne in terminal forking often scorpioid clusters or sometimes axillary; calyx 5-parted or -lobed, with linear or lanceolate segms.; corolla-tube cylindric, with naked throat; stamens included, the filaments very short; ovary 4-celled, with entire terminal style: fr. of 4 nutlets, splitting apart or cohering in pairs. (Heliotro-pium: *heliotropic*, turning to the sun.)

Lvs. not conspicuously narrowed at base: corolla-tube little longer than the calyx.....1. *H. peruvianum*  
Lvs. distinctly narrowed at base: corolla-tube nearly twice as long as calyx.....2. *H. corymbosum*

1. *H. peruvianum*, L. COMMON HELITROPE. Lvs. oval or oblong-lanceolate, very veiny, not conspicuously narrowed at base: fls. about ½ in. long, violet or purple, vanilla-scented, in a close cyme, the corolla-tube little longer than the calyx. Peru.—Certain forms are white-fl'd.

2. *H. corymbosum*, Ruiz & Pav. Lvs. longer, relatively narrower, distinctly narrowed to the base: fl.-clusters larger and more open; fls. violet or purple, about ½ in. long, narcissus-scented, the corolla-tube nearly twice as long as the calyx; calyx-teeth longer and narrower. Peru.—Also with white-fl'd. forms.

11. **CORDIA**, L. Trees or shrubs (some of them vines or above the base herbaceous) occasionally planted for their showy fls.; species about 230 in trop. and sub trop. regions, mostly in the western hemisphere.—Lvs. mostly alternate, petioled, entire or dentate: fls. in dense head-like clusters or scorpioid cymes; calyx tubular or campanulate, 3–5-toothed or -lobed; corolla usually white or orange, tubular, funnellform or salverform, with 4 or more lobes; stamens as many as the corolla-lobes, exserted or included; style 4-lobed or -parted: fr. a 4-celled usually 4-seeded drupe, subtended or more or less inclosed by the persistent calyx. (Cor-dia: a German botanist, Valerius Cordus, born 1515.)

*C. Sebestena*, L. (*Sebesten Sebestena*, Britt.). GEIGER-TREE. Evergreen shrub or small tree, hairy: lvs. rough, ovate, 4–8 in. long, entire or undulate: fls. 1–2 in. long, orange or scarlet, pedicelled, in large open terminal clusters, the crumpled corolla-lobes and the stamens 5–12: drupe about 1 in. long, white, inclosed in the hazel-like husk formed by the persistent calyx. (Sebestena: Arabic name originally applied to a different plant.) Keys of Fla. and S.

#### 148. VERBENACEÆ. VERVAIN FAMILY

Herbs, shrubs, or trees, of trop. and sub trop. distribution, about a score of the genera being in cult. in N. Amer., either as ornamentals or for medicinal or other economic purposes; in all 67 genera and about 750 species; the family is closely related to the Labiate and not clearly distinct.—Lvs. opposite, rarely whorled or alternate, simple or compound: fls. bisexual, rarely regular, usually oblique or 2-lipped; calyx 4–5-, rarely 6–8-toothed; corolla gamo-

petalous, 4-5-lobed, the lobes imbricated; stamens 4 and didynamous or rarely 5 or 2, epipetalous; disk present; ovary superior, of 2 or rarely 4 or 5 carpels, entire or 2-4-lobed, 2-5-celled, but by false partitions 4-10-celled, each cell with a solitary ovule; style 1, stigma usually 1: fr. a drupe or berry, often separating into drupelets.

- A. Fls. sessile in spikes which are simple or clustered.
  - B. Fr. dry, inclosed in the calyx.
    - c. Ovary 4-celled, the fr. separating into 4 nutlets..... 1. VERBENA
    - cc. Ovary 2-celled, the fr. separating into 2 nutlets..... 2. LIPPIA
  - BB. Fr. a fleshy or juicy drupe, merely girt at base by calyx..... 3. LANTANA
- AA. Fls. pedicelled.
  - B. Calyx spreading broadly and uniformly from base upward, the margin entire or very obscurely sinuate-lobed, large..... 4. HOLMSKIOLDIA
  - BB. Calyx not as above.
    - c. Infl. a simple raceme.
      - D. Lobes of calyx shorter than the tube.
        - E. Fr. with calyx inclosing only the basal portion: fls. white or yellow..... 5. CITHAREXYLUM
        - EE. Fr. completely inclosed within calyx: fls. mostly lilac..... 6. DURANTA
      - DB. Lobes of calyx longer than the tube..... 7. PETREA
    - cc. Infl. of cymose or head-like clusters which are variously arranged.
      - D. Lvs. palmately compound..... 8. VITEX
      - DD. Lvs. not compound.
        - E. Fr. drupe-like.
          - F. Corolla regular; stamens moderately or not at all exerted.. 9. CALLICARPA
          - FF. Corolla-limb more or less oblique; stamens very long-exserted..... 10. CLERODENDRUM
        - EE. Fr. dry, subcapsular: corolla irregular..... 11. CARTOPTERIS

1. **VERBENA**, L. Annual or perennial herbs or subshrubs, some of them common flower-garden or greenhouse subjects grown for their clusters of showy and often fragrant fls. which bloom in constant succession from June till frost; about 80-100 species, chiefly natives of trop. and extra-trop. Amer.; some are weedy plants in fields and waste grounds of the U. S. and Canada.—Diffuse or sometimes creeping, glabrous or more or less hairy: lvs. opposite, seldom whorled or alternate, toothed or incised or dissected, rarely entire: spikes terminal, seldom axillary, compact or elongate and remotely fld., sometimes broadly corymbose or paniculate on an erect st.; fls. small or medium-sized, sessile; calyx tubular, 5-ribbed, 5-toothed; corolla-tube straight or incurved, the limb spreading, somewhat 2-lipped, the 5 lobes oblong or broad, obtuse or retuse; stamens 4, in pairs; ovary entire or very shortly 4-lobed at apex, 4-celled, the cells 1-ovuled: fr. dry, inclosed in the calyx, separating into 4 narrow pyrenes or nutlets. (*Verbe-na*: ancient Latin name of the common European vervain, *V. officinalis*.)—Three verbenas are generally cult., *V. venosa*, *V. tenera*, and *V. hybrida*. The others are found in botanic gardens and special collections.

Connective of the upper anthers not appendaged.

Clusters of fls. not paniced: roots not tuberous: lvs. not clasping.

Fl.-clusters oval to oblong.

Teeth or lobes of lvs. sharp: fls. rosy or purple..... 1. *V. phlogiflora*

Teeth or lobes of lvs. rounded: fls. white often becoming pink..... 2. *V. teucrioides*

Fl.-clusters flat or convex.

Sts. commonly creeping at base: lvs. crenate or subincisely and often unequally serrate.

Herbage grayish with long stiffish more or less spreading hairs: fls. variously colored..... 3. *V. hybrida*

Herbage green, the pubescence shorter and sparser: fls. scarlet..... 4. *V. chamædryfolia*

Sts. erect or ascending: lvs. pinnatifid, more deeply cut than in any of the preceding species..... 5. *V. incisa*

Clusters of fls. paniced: roots tuberous: lvs. clasping..... 6. *V. venosa*

Connective of the upper anthers furnished with a glandular appendage.

Lvs. cut into linear divisions..... 7. *V. tenera*

Lvs. with divisions  $\frac{1}{4}$  in. or more broad..... 8. *V. canadensis*

1. *V. phlogiflora*, Cham. Sts. ascending; branches rather erect, much subdivided, angled, retrorsely or spreading-hirsute: lvs. oblong or lanceolate-triangular, acute, unequally subincised serrate, at base entire and cuneately long-attenuate into an evident petiole, somewhat venosely rugose, strigose above, below hairy or strigillose-pubescent: fls. rosy or purple, the spikes terminal, pedunculate, many-flid., oval to oblong; bracts short-ovate to subulate-lanceolate; calyx twice as long as bracts, covered with short pubescence interspersed with short capitate glandular hairs. S. Brazil and Uruguay.

2. *V. teucroides*, Gill. & Hook. Sts. ascending, terete, openly and copiously hirsute: lvs. ovate to oblong-triangular, sessile or nearly so, obtusely toothed, entire at base, veiny-rugose, glandular-pubescent above, hispidulous on veins below: spikes terminal, solitary, glandular, hairy, lax, 5-9 in. long; bracts subulate-lanceolate, ciliate; calyx nerved, twice as long as the bracts; corolla yellowish-white or pinkish, long-exserted, twisting in age, fragrant. S. Brazil, Uruguay, Argentina, Chile, and Peru.

3. *V. hybrida*, Voss. COMMON GARDEN VERBENA. Sts. stoutish, 1-1 $\frac{3}{4}$  ft. long, decumbent and commonly creeping at base: entire plant grayish with long stiffish more or less spreading hairs or these less pronounced on the upper surface of the lvs.: lvs. petioled, oblong or oblong-ovate, obtuse, the margin with broad unequal rounded teeth or near the base somewhat lobed: peduncles and infl. glandular; heads flattish or convex, mostly long-peduncled, the fls. red, pink, white, blue, purple, or variegated; bracts and calyx as in *V. chamædryfolia*; corolla-tube often twice as long as calyx, hairy within and often glandular-pubescent without, the limb about  $\frac{3}{4}$  in. across, with broad obovate deeply notched lobes and white or yellow eye at center; stamens included.—A race running into many color forms and resulting probably from the fusion of *V. chamædryfolia* with other species. From *V. chamædryfolia* it differs mainly in its stouter sts., its grayish hue due to longer and more dense spreading stiffish hairs, in the more uniformly rounded teeth and lobes of the usually obtuse lvs., in the larger size of its heads and fls. (the latter variously colored) and in the proportionally broader corolla-lobes. Its flattish or convex heads serve to distinguish it from *V. phlogiflora* and *V. teucroides*, although its foliage is very similar to that of the latter, while its usually creeping habit and less deeply cut lvs. separate it from *V. incisa*.

4. *V. chamædryfolia*, Juss. Sts. slender, forking, creeping at base, rather stiffly pubescent; branches somewhat ascending: lvs. oblong-lanceolate or ovate, more or less attenuate at base into a short petiole, crenate or subincisely and often unequally serrate, appressed-hispid: fls. in flattish capitate spikes which are solitary on long ascending peduncles; bracts lanceolate-subulate, ciliate; calyx sparingly glandular, more than twice as long as the bracts; corolla-limb irregular, rich scarlet; tube white, nearly twice as long as calyx; stamens included. Argentina, S. Brazil.—Two rather distinct races occur, one less hairy, with oblong to oblong-lanceolate lvs. unequally incised-serrate, the other more hairy and with shorter broader lvs.

5. *V. incisa*, Hook. Plant hairy throughout; sts. erect or ascending, branched: lower lvs. oblong-triangular, pinnatifid, lobed or deeply serrate and incised, more deeply cut than in the preceding species, at base cuneately truncate or subcordately attenuate into an evident petiole; upper lvs. sessile, sublanceolate, incisely pinnatifid: fls. rosy or purple, the heads terminal, pedunculate, subternate, flat or convex; bracts lanceolate; calyx four times as long as the bracts, short-hairy, sprinkled with glandular hairs; corolla-tube glandular-pubescent, one-third longer than the calyx; limb large, rosy or purple, paler beneath, the obovate lobes deeply emarginate. S. Brazil, Paraguay, and N. Argentina.

6. *V. venosa*, Gill. & Hook. Herbaceous perennial 1 ft. high, with tuberous roots; sts. simple, creeping at base, ascending, 4-angled, hispid: lvs. rigid, hispid, prominently nerved, oblong to oblong-lanceolate, unequally subincisely and often saliently dentate or serrate, acute at apex, entire and half-clasping at base: spikes in a close terminal panicle, subternate, fastigate and finally cylindric, at least the lateral pedunculate; bracts subulate, ciliate, often purplish, exceeding the hairy calyx; corolla lilac or bluish-purple to nearly sky-blue, very thinly villous without, the slender tube three times as long as the calyx: fr.  $\frac{1}{2}$  in. long, fuscous outside, with 5 dorsal ridges. S. Brazil and Argentina.

7. *V. tenera*, Spreng. Somewhat shrubby perennial; sts. cespitose, decumbent, rooting; branches slender, 4-angled, ascending, sparsely hairy: lvs. 3-parted and again pinnately cut into linear, acute, entire, subrevolute divisions, narrowed at base to a short petiole, strigose-hispidulous: spikes terminal, pedunculate; calyx elongated, twice as long as the bracts, strigose-pubescent or hairy, sprinkled at

angles with short stipitate patellaform glands; corolla rose-violet; anther-appendages barely exerted, claviculate, subrecurved. S. Brazil and La Plata region.—A supposed hybrid has rosy pink or carmine fls. with white-margined corolla-lobes. It is sometimes called the Italian verbenas as introduced from Italy.

8. *V. canadensis*, Britt. (*V. Aubletia*, Jacq. *V. Drummondii*, Hort. *V. montana*, Hort., in part). Perennial 6-18 in. high, branching and ascending from a creeping or rooting base, slender, soft-pubescent, hirsute or glabrate: lvs. 1-2 in. long, ovate or ovate-oblong, with truncate or broadly cuneate base tapering into a margined petiole, incisely lobed and toothed, often more deeply 3-cleft: spikes pedunculate, elongated in fr.; bracts subulate or linear-attenuate, shorter than or equaling the similar slender and unequal teeth of the narrow calyx; corolla reddish-purple or lilac, rarely white, the limb  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad; tube bearded within and at the orifice. Colo. and Mex. eastward across the continent.

2. *LIPPIA*, L. Species about 125 in trop. Amer., 2 to 3 in Afr., and a few widely dispersed in all warm countries, one a popular greenhouse plant in the N. or grown in the open S.—Herbs or shrubs: lvs. opposite or in whorls of 3, rarely alternate, entire, toothed or lobed: fls. small and often lantana-like, mostly white, rose, or purplish, in heads or spikes; calyx 2-4-toothed or -cleft, inclosing the dry fr. which becomes 2 separate nutlets; corolla 4-lobed, oblique or 2-lipped, the tube cylindric and straight or curved, the lobes broad and usually retuse; stamens 4, didynamous, attached at the middle of the corolla-tube, nearly or quite included; ovary 2-celled, with 1 ovule in each cell. (*Lip-pia*: Dr. Auguste Lippi, French traveler, 1678-1703.)

Fls. in slender naked spikes: plant a shrub.....1. *L. citriodora*  
Fls. capitate or in short dense spikes, with broad bracts: low creeping plant  
rooting at base and widely spreading.....2. *L. canescens*

1. *L. citriodora*, HBK. (*Aloysia citriodora*, Ort.). LEMON VERBENA (as indicated in the name *citriodora*). Small shrub to about 10 ft. high, with striate and more or less scabrous branches: lvs. in whorls of 3 or 4, lanceolate, 2-3 in. long, short-petioled, entire or toothed at the middle, glabrous, densely covered beneath with glandular dots, lemon-scented: spikes whorled and axillary or collected in terminal panicles often 3 in. across; fls. white, about  $\frac{1}{4}$  in. long, blooming in summer and autumn. Argentina, Chile.

2. *L. canescens*, HBK. (*L. repens*, Hort., not Spreng.). Rooting and widely spreading canescent plant grown for ground-cover, with sts. somewhat woody at base: lvs. small, to about  $\frac{3}{4}$  in. long on creeping flowering shoots, spatulate to oblong or lanceolate, attenuate to petiole, acute, dentate toward apex: heads ovoid or subcylindric,  $\frac{1}{4}$  to nearly  $\frac{1}{2}$  in. across, on long peduncles; bracts herbaceous with narrow membranaceous villous margins, obovate-cuneate, acuminate, imbricated, shorter than the corolla-tube; calyx short, 2-toothed; corolla rosy with yellow throat. S. Amer.; grown in Calif.

3. *LANTANA*, L. Shrubs sometimes half-climbing, one a popular florists' plant; probably 50 species mostly in trop. and subtrop. Amer. but also in the Old World.—Scabrous-hirsute, pubescent or tomentose: lvs. opposite or whorled, dentate, often rugose: fls. small, sessile in the axils of the bracts, borne in dense spikes or heads which are terminal or axillary and stalked; calyx very small; corolla somewhat irregularly 4-5-parted but not bilabiate, the tube slender; stamens 4, didynamous, attached midway in the tube, included; ovary 2-celled, becoming a fleshy or juicy drupe with 2 bony nutlets. (*Lanta-na*: old name, also applied to a *Viburnum*.)

Bracts not more than half as long as the corolla.

Fls. opening yellow or pink and changing to orange or scarlet: plant

often with short hooked prickles.....1. *L. Camara*

Fls. lilac: plant without prickles.....2. *L. Sellowiana*

Bracts nearly or quite as long as the corolla; fls. white or lilac.....3. *L. involucrata*

1. *L. Camara*, L. (*L. aculeata*, L.). Hairy shrub to 4 ft. high or up to 20 ft. in tropics, sometimes with short hooked prickles: lvs. ovate or cordate-ovate, 1-6 in. long, mostly short-acuminate, crenate-dentate, short-petioled, rather thick, rugose, scabrous above, pubescent beneath: heads dense, 1-2 in. across, flat-topped, on stout axillary peduncles often longer than the lvs.; bracts narrow, about half as



long as the corolla; fls.  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, usually opening yellow or pink, but changing to orange or scarlet. (Camara: S. American name.) Trop. Amer. north to Tex. and S. Ga.—There are several vars. whose fls. are variously colored.

2. *L. Sellowiana*, Link & Otto (*L. delicatissima*, Hort.?). WEEPING or TRAILING LANTANA. Free-flowering shrub with lopping or trailing pubescent branches: lvs. ovate, about 1 in. long, narrowed at base, coarsely toothed: fls. about  $\frac{1}{2}$  in. long, in long-peduncled heads 1 in. or more across, rosy-lilac, the outer bracts or scales of the involucre broad-ovate and hairy and not more than half as long as the slender pubescent corolla-tube. (Named for Dr. Sellow, of Potsdam, who traveled in Brazil for 15 years; page 537.) S. Amer. and apparently an escape in Fla.

3. *L. involucrata*, L. Much-branched shrub to 6 ft. high with obscurely 4-angled gray branches: lvs. ovate, about 1 in. long, crenate-dentate, obtuse: fls.  $\frac{1}{8}$  in. long, in long-peduncled heads about  $\frac{3}{4}$  in. diam., light lilac or white, nearly or quite equaled by the ovate involucral bracts. Trop. Amer. north to S. Fla. and S. Tex.

4. *HOLMSKIOLDIA*, Retz. Shrubs sometimes grown under glass or in the open far S.; probably 3 species, African and Asian.—Glabrous or white-hairy: lvs. opposite, entire or dentate: fls. racemose or cymose; calyx spreading from base, membranaceous, colored, the border entire or broadly and indistinctly 5-lobed; corolla-tube curved, the oblique limb with 5 short lobes; stamens 4, didynamous, exserted together with the style: fr. an obovoid drupe, 4-lobed, included in the enlarged calyx. (Holmskiold-ia: Theodor Holmskiold, 1732–1794, Danish nobleman and scientist.)

*H. sanguinea*, Retz. A straggling evergreen shrub 10–30 ft. high: lvs. ovate, 2–4 in. long, petioled, entire or serrate, acuminate: calyx brick-red to orange, spreading broadly and uniformly from base upward, the margin entire or very obscurely sinuate-lobed, becoming 1 in. diam.; corolla darker colored, 1 in. long, the upcurved tube widening upward: drupe  $\frac{1}{2}$  in. or less long. Subtrop. Himalayan region.—Sometimes called Chinese Hat-Plant because of the large spreading calyx.

5. *CITHAREXYLUM*, L. About 20 species of shrubs or trees, occasionally planted in the S., native Mex. to S. Amer.—Unarmed or rarely spiny, tomentose or glabrous: lvs. opposite, entire, serrate or spinose-toothed, somewhat coriaceous: fls. white or yellow, fragrant, small, in terminal or axillary racemes; calyx with minutely 5-toothed limb; corolla salverform, the 5-parted limb somewhat oblique and unequal; stamens 4 or 5, inserted on the corolla-tube, the fifth one mostly sterile or rudimentary; ovary more or less 4-celled, each cell 1-seeded; stigmas 2: fr. a fleshy drupe, its basal portion inclosed in the calyx. (*Citharexylum*: *zither-wood*, used in making certain musical instruments.)

Calyx nearly truncate: tree.....1. *C. spinosum*  
Calyx 5-toothed: low shrub.....2. *C. ilicifolium*

1. *C. spinosum*, L. (*C. quadrangulare*, Jacq.). FIDDLE-WOOD. Tree to 50 ft., the trunk sometimes 3 ft. in diam., with 4-sided glabrous branchlets: lvs. elliptic or oblong-elliptic, to 8 in. long, entire or coarsely serrate, acute or acuminate, narrowed at base to a petiole  $\frac{1}{2}$ –1 in. long: fls. very fragrant, about  $\frac{1}{2}$  in. long, in slender many-fld. racemes sometimes 1 ft. long, often branched near base; calyx puberulent, nearly truncate; corolla white, the basal half of the lobes hairy within: drupe obovoid-oblong, black, shining, nearly  $\frac{1}{2}$  in. long. W. Indies.

2. *C. ilicifolium*, HBK. Unarmed much-branched low shrub, with 4-angled branches: lvs. elliptic-oblong, 1–2 in. long, narrowed to a short petiole, entire or spinose-dentate, thick, with revolute margin, shining above and punctate beneath: fls. white,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, in a short terminal raceme; calyx 5-toothed, pubescent; corolla not much longer than calyx, the inner surface of the lobes pilose throughout: drupe size of a pea. Ecuador.

6. *DURANTA*, L. Shrubs and trees of 8–10 species in Mex., W. Indies, S. Amer., one reaching Key West, cult. in the open S. and sometimes in the greenhouse.—Glabrous or woolly, often armed with axillary spines: lvs.

opposite or whorled, entire or toothed: racemes long or short, terminal or rarely axillary; fls. small, in the axils of small bracts; calyx inclosing the fr. at maturity but not attached to it; corolla-limb of 5 spreading oblique or equal lobes, the tube usually curved; stamens 4, didynamous; stigma unequally 4-lobed: fr. an 8-seeded juicy drupe inclosed by the enlarged calyx. (Duran-ta: after Castor Durantes, physician in Rome and botanist, died about 1590.)

**D. repens**, L. (*D. spinosa*, L. *D. Plumieri*, Jacq. *Ellisia acuta*, L.). GOLDEN DEWDROP. PIGEON-BERRY. Shrub or small tree to 18 ft. high, the branches unarmed or spiny, often drooping or trailing: lvs. ovate-elliptic, oval or obovate,  $\frac{1}{2}$ -4 in. long, attenuate into short petiole, entire or coarsely serrate above the middle, obtuse or acute, finely pubescent or glabrous at length: fls. in loose paniced racemes; calyx with acute lobes shorter than the tube; corolla lilac, the tube longer than the calyx, the limb less than  $\frac{1}{2}$  in. across: fr. yellow, globose,  $\frac{1}{4}$  to nearly or quite  $\frac{1}{2}$  in. diam., covered by the calyx which is closed into a curved beak. Key West, W. Indies, Mex. to Brazil.—Forms with white fls. and variegated lvs. are reported in cult.

**7. PETREA**, L. Species about a dozen in Mex., W. Indies to Brazil; twining or arborescent shrubs, sometimes planted in warm regions.—Lvs. opposite, leathery, pinnately veined: fls. violet, purple or bluish, in long terminal racemes; calyx with 5 scales in throat, the colored lobes often becoming green and rigid in fr.; corolla usually a little more intensely colored, the oblique limb 5-cut, the tube short-cylindric; stamens 4, didynamous; ovary imperfectly 2-celled, the cells 1-ovuled: fr. included in the calyx, indehiscent, 2-celled and 2-seeded or by abortion 1-seeded. (Petre-a: Robt. James, Baron Petre, 1713-1743, a patron of botany.)

**P. volubilis**, Jacq. PURPLE WREATH. Woody vine sometimes 15 ft. long: lvs. rough, thick, ovate, elliptic or oblong, 3-6 in. long, entire or undulate, acute or obtuse, short-petioled: fls. blue, in terminal racemes 8 in. or more long, blooming in early spring; calyx-tube one-quarter to one-half as long as the pedicel, the 5 oblong obtuse lobes three to four times longer than the tube in fr., exceeding the funnellform deciduous corolla. Cuba to Brazil.

**8. VITEX**, L. Trees or shrubs yielding a few ornamental subjects; about 60 species, distributed throughout the trop. and sub trop. regions of both hemispheres, few in temp. regions.—Lvs. deciduous or evergreen, opposite, digitate, with 3-7 (rarely 1) lft.: fls. white, blue, or yellowish, in few to many-fld. cymes which are often paniced; calyx campanulate, usually 5-toothed; corolla tubular-funnelform, with 5-lobed oblique and slightly 2-lipped limb; stamens 4, didynamous, often exserted: fr. a small drupe, with a 4-celled stone. (Vi-tex: ancient Latin name for this or a similar shrub.)

Fl.-clusters dense, arranged in a single spike-like infl. or these in groups

of several: lfts. lanceolate. . . . . 1. *V. Agnus-castus*

Fl.-clusters loose, in a widely spreading panicle: lfts. mostly broader. . . . . 2. *V. Negundo*

**1. V. Agnus-castus**, L. CHASTE-TREE. HEMP-TREE. MONKS PEPPER-TREE. Grayish-tomentose shrub or small tree to 10 ft. high, with a strong aromatic odor: lvs. long-petioled, velvety; lfts. 5-7, lanceolate, 3-4 in. long, acuminate, narrowed at base to a short stalk, entire or with a few coarse teeth, very dark green above, grayish-tomentose beneath: fls. in late summer and autumn, the dense clusters arranged in spikes 5-7 in. long, these terminal or in the upper axils, often forming groups of several; corolla usually pale or lilac (in a var. white), grayish outside,  $\frac{1}{2}$  in. long; stamens and style exserted. (Agnus-castus: ancient classical name.) S. Eu.

**2. V. Negundo**, L. Shrub or small tree to 15 ft. high, with quadrangular branchlets: lvs. long-petioled; lfts. usually 5, occasionally 3, stalked, elliptic-ovate to lanceolate,  $1\frac{1}{2}$ -4 in. long, acuminate, serrate or entire, dark green above, grayish-tomentulose beneath: fls. lilac or lavender, scarcely  $\frac{1}{4}$  in. long, stalked, in rather loose clusters arranged in a loose widely spreading terminal panicle 5-8 in. long; stamens and style slightly exserted. (Negundo: Malabar name.) China, India.—Var. *incisa*, Clarke (*V. laciniata*, Hort.) has lfts. incisely serrate, or in extreme forms deeply pinnatifid, and less showy fls. Late summer. N. China, Mongolia.

9. **CALLICARPA**, L. More than 30 species in trop. and subtrop. regions of Asia, Australia, N. and Cent. Amer.; a few planted for ornament.—Shrubs or trees, often with stellate or scurfy pubescence: lvs. opposite, usually serrate, deciduous: fls. small, pink, bluish, or whitish, in axillary clusters; calyx short-campanulate, truncate or slightly 4-toothed, rarely 4-parted; corolla with short tube, 4-lobed; stamens 4, equal, exserted; ovary 4-celled, the cells 1-ovuled: fr. a subglobose berry-like drupe with 2-4 stones. (Callicarpa: Greek *beauty* and *fruit*.)

Corolla glabrous: lvs. tomentose beneath.....1. *C. americana*  
Corolla glandular outside: lvs. slightly or not at all pubescent and glandular beneath.

Lvs. serrulate,  $2\frac{1}{2}$ -5 in. long.....2. *C. japonica*  
Lvs. crenate-serrate above middle, entire toward base,  $1\frac{1}{2}$ -3 in. long...3. *C. purpurea*

1. ***C. americana***, L. FRENCH-MULBERRY. Shrub to 6 ft. high, with scurfy-stellate down and glandular-dotted: lvs. ovate-oblong, 2-6 in. long, acuminate, obtusely serrate, acute or cuneate at base, greenish above, whitish or rusty beneath: cymes shorter than the petiole, many-fld.; corolla bluish, hardly  $\frac{1}{2}$  in. long: fr. violet. Summer. Va. to Tex. and W. Indies.—A var. has white fr. very conspicuous in fall and early winter.

2. ***C. japonica***, Thunb. Shrub to 5 ft. high: lvs. elliptic or ovate-lanceolate,  $2\frac{1}{2}$ -5 in. long, long-acuminate, serrulate, cuneate at base: cymes peduncled, many-fld.; fls. pink or whitish, about  $\frac{1}{4}$  in. long: fr. violet. Aug. Japan.—A white-fruited var. is offered.

3. ***C. purpurea***, Juss. (*C. dichotoma*, Koch). Shrub to 4 ft. high: lvs. elliptic or obovate,  $1\frac{1}{2}$ -3 in. long, crenately serrate above the middle, entire toward the cuneate base: cymes peduncled, few- to many-fld.; fls. pink, about  $\frac{1}{8}$  in. long: fr. lilac-violet. Late summer. Japan, China.

10. **CLERODENDRUM**, L. GLORYBOWER. Shrubs or trees, often scandent, cult. in the greenhouse and out-of-doors; perhaps 100 species in the tropics, mostly of the eastern hemisphere.—Lvs. opposite or verticillate, mostly entire, sometimes toothed or lobed, not compound: fls. usually in terminal cymes or panicles, white, violet or red; calyx campanulate or rarely tubular, shallowly 5-toothed or 5-lobed; corolla-tube usually slender and cylindric, the limb somewhat unequally 5-lobed and spreading; stamens 4, inserted on the corolla-tube, long-exserted and curved; style exserted, shortly 2-cleft; ovary imperfectly 4-celled, the cells 1-ovuled: fr. a drupe often inclosed in the calyx. (Clerodendrum: Greek *chance* and *tree*; of no significance.)

Plant of twining habit.

Calyx white.....1. *C. Thomsonæ*  
Calyx pale red.....2. *C. speciosum*

Plant of erect or self-supporting habit.

Calyx large and spreading, about  $\frac{1}{2}$  in. long.

Lvs. truncate or cordate at base, coarsely toothed, acute.....3. *C. fragrans*

Lvs. narrowed at base, very closely serrate or entire, long-acuminate

.....4. *C. trichotomum*

Calyx small, less than  $\frac{1}{4}$  in. long.

Fls.  $1\frac{1}{2}$ -2 in. diam.: lvs. densely pubescent above.....5. *C. speciosissimum*

Fls.  $\frac{3}{4}$  in. diam.: lvs. glabrous or sparsely pubescent above.....6. *C. foetidum*

1. ***C. Thomsonæ***, Balfour (*C. Balfourii*, Hort.). Tall twining glabrous evergreen shrub: lvs. opposite, oblong-ovate or ovate, often 4-5 in. long, acuminate, entire, petiolate, prominently veined: fls. in lax forking axillary or terminal racemes; calyx about  $\frac{3}{4}$  in. long, strongly 5-angled, narrowed at apex, white, the 5 segms. ovate and acute; corolla with slender tube about 1 in. long, and spreading crimson rotund-lobed limb; stamens and style long and well-exserted. (Named for the wife of W. C. Thomson, missionary at Old Calabar on the west coast of trop. Afr., who in 1861 sent specimens of this plant to Balfour at Edinburgh.) W. Afr.—A var. has very large clusters of fls. with pure white or green-tinged calyx and large rose-magenta corolla.

2. ***C. speciosum***, Lem. A garden hybrid between *C. Thomsonæ* and *C. splendens*, Don., the latter being a climber with slender woody sts. producing on leafy growths dense many-fld. cymes of fls. 1 or more in. diam., bright scarlet passing into bright

yellow: the hybrid is intermediate between the parents in habit and foliage, producing continuously throughout the summer a profusion of dull red fls. whose old calices are more or less persistent and ornamental after the fls. are past.

3. *C. fragrans*, Vent. (*C. coronaria*, Hort.?). Subshrub to 8 ft. high, with angled branches, pubescent: lvs. broadly ovate, 3-6 in. or more long, truncate or cordate at base, on long stout petioles, acute, coarsely toothed, ill-scented: fls. white or bluish, in terminal compact hydrangea-like corymbs, usually double, very fragrant; calyx not  $\frac{1}{2}$  in. long, the segms. narrow and acuminate, the corolla-tube hardly exserted. China, Japan.

4. *C. trichotomum*, Thunb. (*Volkameria japonica*, Hort., not Thunb.). Erect graceful subshrub to 10 ft. or more high: lvs. mostly opposite, soft and flaccid, ovate, to 5 in. long, somewhat narrowed at base, entire or closely serrate, long-acuminate, pubescent with short stiffish hairs: fls. on slender forking reddish peduncles, the white corolla with slender tube sometimes twice as long as the reddish-brown ( $\frac{1}{2}$  in. long) calyx; segms. of calyx ovate, acute, turning red: fr. bright blue. Japan.

5. *C. speciosissimum*, Paxt. (*C. fallax*, Lindl.). Erect subshrub to 4 ft. high, branching after flowering, the st. bluntly 4-angled: lvs. cordate-ovate, often 1 ft. long on stout hairy petioles, entire or toothed, acute or acuminate, densely pubescent: infl. erect, often 18 in. or more in length; fls. numerous, bright scarlet,  $1\frac{1}{2}$ -2 in. diam., the narrow tube 1 in. long, much exceeding the short-toothed calyx, the rounded lobes reflexed. Java.

6. *C. foetidum*, Bunge. Shrub to 6 ft. high, of spreading habit, sparsely branched: lvs. opposite, very broadly ovate, often 1 ft. long, long-petioled, coarsely toothed, acuminate, dark green above, pubescent and reddish beneath, strongly-scented: fls. rosy-red,  $\frac{3}{4}$  in. diam., in a dense capitate corymb 4-8 in. across; calyx short, toothed, the slender corolla-tube three to four times longer. Aug. China.

11. **CARYOPTERIS**, Bunge. BLUEBEARD. About a half-dozen species of deciduous shrubs in E. Asia, one planted for ornament.—Glabrous, pubescent or tomentose: lvs. opposite, short-petioled, serrate: cymes many-fl'd., axillary or paniced and terminal; calyx campanulate, deeply 5-lobed with lanceolate teeth, spreading and somewhat enlarged in fr.; corolla 5-lobed, with short cylindric tube and spreading limb, 1 segm. larger and fringed; stamens 4, exserted, 2 of them longer; style slender, 2-parted at apex: fr. dry, capsular, shorter than the calyx, 4-valved, separating into 4 somewhat winged nutlets. (Caryop-teris: Greek for *nut* and *wing*.)

*C. incana*, Miq. (*C. Mastacanthus*, Schauer). Small shrub to 5 ft. high: lvs. ovate or oblong-ovate,  $1\frac{1}{2}$ -3 in. long, petioled, coarsely serrate, very dark green above, grayish-tomentose beneath: cymes in pedunculate clusters, densely-fl'd.; fls. violet-blue or lavender-blue, in autumn; corolla about  $\frac{1}{4}$  in. long; stamens exserted about  $\frac{1}{4}$  in. China, Japan.—Known to the nursery trade as "blue spirea." A var. has white fls.

#### 149. LABIATÆ. MINT FAMILY

A family of more than usual economic importance owing to the volatile oil and bitter principles, comprising 160 genera and about 3,000 species distributed over the whole earth, but especially abundant in the Medit. region, the Orient and the mts. of the subtropics; 40 or more genera are in cult. in N. Amer., most of them being garden annuals or perennials cult. for the flavor or odor, for ornamental purposes or for medicine; the name refers to the 2-lipped (bilabiate) character of the corolla of most species.—Herbs or shrubs, commonly with 4-angled sts., and usually containing a fragrant oil: lvs. opposite or whorled: fls. bisexual, very rarely unisexual, irregular, seldom regular, usually bilabiate; calyx regular or 2-lipped, commonly 5-toothed or -cleft; corolla hypogynous, gamopetalous, 5-lobed or rarely 4-lobed, 1 lip sometimes obsolete, the lobes imbricated; stamens 4, didynamous, or only 2, epipetalous; hypogynous disk well-developed, thick, entire or lobed; ovary superior, of 2 carpels, deeply 4-lobed, 4-celled, each cell 1-ovuled; style basal or sub-basal;



# LABIATÆ

stigmas 2: fr. of 4 1-seeded nutlets ("seeds"), the ectocarp rarely fleshy.  
J, K, L, Fig. 12, page 570.

- A. Perfect stamens 2, the other 2 rudimentary or obsolete.
  - B. Limb of calyx 2-lipped.
    - c. Lf.-margins revolute: lvs. evergreen. . . . . 1. ROSMARINUS
    - cc. Lf.-margins not revolute: lvs. not evergreen.
      - d. Calyx spathe-like, very deeply cleft in front. . . . . 2. AUDIBERTIA
      - dd. Calyx not spathe-like, less deeply cleft in front. . . . . 3. SALVIA
  - BB. Limb of calyx 5-toothed, the teeth equal or nearly so.
    - c. Fls. (in ours) 1-2 in. long, arranged in dense head-like clusters. . . . . 4. MONARDA
    - cc. Fls. (in ours) about  $\frac{1}{4}$  in. long, arranged in loose cymose clusters. . . . . 5. CUNILA
- AA. Perfect stamens 4.
  - B. Floral lvs. small, not conspicuous in the infl., commonly not longer than the fls.
    - c. Lvs. (in ours) narrow, not  $\frac{1}{4}$  in. wide.
      - d. Whorls of fls. crowded in dense cylindric spikes on long peduncles; calyx 5-toothed. . . . . 6. LAVANDULA
      - dd. Whorls of fls. axillary and distant or gathered in short loose head-like clusters scarcely peduncled; calyx bilabiate. . . . . 7. THYMUS
    - cc. Lvs. broader, often 1-2 in. wide.
      - d. Fls. (in ours)  $\frac{3}{4}$ -1 in. long, with broad tube: lvs. oblong to lanceolate, all but the lowest sessile. . . . . 8. PHYSOSTEGIA
      - dd. Fls. (except in *Stachys grandiflora*) smaller and shorter: lvs. mostly more or less ovate and petiolate.
        - e. Floral whorls in a short stout spike-like infl. more or less interrupted below: lvs. commonly crenate and obtuse.
          - f. Calyx 5-10-nerved, the teeth (in ours) tipped with a short subspinose tip. . . . . 9. STACHYS
          - ff. Calyx 15-nerved, the teeth tapering to a slender bristle-like tip or acute. . . . . 10. NEPETA
        - ee. Floral whorls in slender elongate more or less open spikes, in axillary whorls or in a branching infl.: lvs. often toothed and acute or acuminate.
          - f. Pedicels of fls. (in ours) usually as long as or longer than calyx: lvs. prevailingly showily colored. . . . . 11. COLEUS
          - ff. Pedicels of fls. shorter than calyx.
            - g. Plants often spreading by rootstocks, stolons or leafy runners. . . . . 12. MENTHA
            - gg. Plants not spreading by rootstocks, stolons or leafy runners.
              - h. Corolla-tube (in ours) exserted beyond calyx: lvs. green.
                - i. Color of corolla creamy-white: plants dioecious. . . . . 13. IBOZA
                - ii. Color of corolla blue or purple: plants not dioecious. . . . . 14. ELSHOLTZIA
              - hh. Corolla-tube not exserted from calyx or scarcely so: lvs. often purplish.
                - i. Lf.-blade  $2\frac{1}{2}$ -4  $\frac{1}{2}$  in. long (in ours), very broadly ovate: calyx bilabiate in fr. . . . . 15. PERILLA
                - ii. Lf.-blade mostly smaller, merely ovate: calyx with margin of upper tooth decurrent into the tube. . . . . 16. OCIMUM
        - BB. Floral lvs. as large as st.-lvs. or nearly so, conspicuous in the infl., often longer than fls.
          - c. Fls. borne in dense head-like clusters which are axillary and commonly remote and many-fl'd.
            - d. Corolla (in ours)  $\frac{3}{4}$ -2 in. long.
              - e. Bracts not over half as long as calyx-tube; corolla not conspicuously hairy.
                - f. Calyx-teeth acute; corolla orange-scarlet. . . . . 17. COLQUHOUNIA
                - ff. Calyx-teeth mostly subulate; corolla purple-red varying to white. . . . . 18. LAMIUM
              - ee. Bracts equaling or nearly equaling calyx-tube; calyx-teeth acuminate or acrose-tipped; corolla conspicuously hairy.
                - f. Upper lip of corolla much longer than the lower; fls. deep orange (or white),  $1\frac{1}{2}$ -2 in. long. . . . . 19. LEONOTIS
                - ff. Upper lip of corolla not longer than the lower; fls. yellow or purple, not over  $1\frac{1}{2}$  in. long. . . . . 20. PHLOMIS
            - dd. Corolla (in ours) not over  $\frac{3}{4}$  in. long, commonly shorter.
              - e. Plant white-woolly: calyx-teeth (in ours) tipped with a hooked spine. . . . . 21. MARRUBIUM
              - ee. Plant not white-woolly: calyx-teeth not tipped with a hooked spine.
                - f. Calyx 2-lipped. . . . . 22. MELISSA
                - ff. Calyx equally 5-toothed. . . . . 12. MENTHA
          - cc. Fls. not borne as above.

- d. Corolla nearly 1-2 in. long; calyx bilabiate.  
 e. Lips of calyx entire, the upper lip with a crest-like projection on the back. .... 23. SCUTELLARIA  
 ee. Lips of calyx toothed, the upper lip not as above. .... 24. DRACOCEPHALUM  
 dd. Corolla not over  $\frac{3}{4}$  in. long.  
 e. Infl. consisting of dense spikes, several of them clustered together.  
 f. Bracts purplish, glabrous. .... 25. ORIGANUM  
 ff. Bracts not purplish, densely white-hairy. .... 26. MAJORANA  
 ee. Infl. not as above.  
 f. Calyx-limb broadly dilated; corolla hardly thrust out of calyx; bracts subulate, thorn-like. .... 27. MOLUCELLA  
 ff. Calyx-limb not broadly dilated; corolla (in ours) exserted; bracts not thorn-like.  
 g. Lvs. (in ours) oblong-elliptic or obovate, rounded at apex, the upper and floral ones sessile. .... 28. AJUGA  
 gg. Lvs. (in ours) mostly narrower and acute (sometimes obtuse), the upper and floral ones often petioled.  
 h. Upper lip of corolla very small or deeply cleft so that the corolla appears 1-lipped; stamens strongly exserted from between lobes of upper corolla-lip. .... 29. TEUCRIUM  
 hh. Upper lip of corolla and stamens not as above.  
 i. Stamens strongly exserted. .... 30. HYSSOPUS  
 ii. Stamens scarcely or not at all exserted. .... 31. SATUREIA

1. **ROSMARINUS**, L. ROSEMARY. A single species native to the Mediterranean region, well known as a garden plant, its aromatic lvs. being used as a seasoning and furnishing a volatile oil common in drug-stores.—Evergreen shrub: lvs. narrow, entire, with revolute margins: fls. subsessile, in short axillary racemes, with minute bracts; calyx ovoid-campanulate, the limb 2-lipped, the upper lip very shortly 3-toothed, the lower 2-toothed; corolla bilabiate, the upper lip emarginate or 2-cleft, the lower strongly 3-lobed, with large middle lobe strongly concave and declined; perfect stamens 2: nutlets smooth, ovoid-subglobose. (Rosmarinus: Latin *sea-dew*, the plant common on the chalk hills of the south of France and near the seacoast.)

**R. officinalis**, L. Shrub 2-4 ft. high, a var. prostrate: lvs. numerous, linear, to  $1\frac{1}{4}$  in. long, obtuse, thick, punctate, tomentose beneath, with strongly revolute margins: fls. about  $\frac{1}{2}$  in. long, in short axillary more or less tomentose racemes, borne in early spring; stamens exserted.

2. **AUDIBERTIA**, Benth. (*Ramona*, Greene). Herbs or subshrubs from W. N. Amer., mostly Calif., sometimes grown as bee plants or for ornament; about 10 species, closely related to *Salvia*.—Perennial, often white-tomentose, with usually rugose sage-like lvs.: fls. axillary or terminal, resembling those of *Salvia officinalis*; calyx differing from *Salvia* in being almost spathe-like and more deeply cleft in front; corolla with upper lip spreading, 2-lobed or emarginate, the lower spreading and 3-lobed; anther-bearing stamens 2, the filaments exserted and bearing a single fertile anther-cell: nutlets smooth, unchanged when wet. (Audibertia: M. Audibert of Tarascon, Provence.)—Fls. in spring and summer.

Foliage deep green: style and stamens little exserted. .... 1. *A. stachyoides*  
 Foliage gray or silvery: style and stamens much exserted.

Corolla light purple, barely  $\frac{1}{2}$  in. long, the tube longer than the limb. .... 2. *A. nivea*  
 Corolla pale or white,  $\frac{3}{4}$  in. long, the tube shorter than the limb. .... 3. *A. polystachya*

1. **A. stachyoides**, Benth. (*Salvia mellifera*, Greene). BLACK SAGE. Shrubby, rigid, branching and leafy, 3 ft. high or more, finely tomentose or glabrate: lvs. oblong-lanceolate, to 3 in. long, short-petioled or narrowed at base, crenate; floral lvs. and ovate or oblong bracts and also calyx-teeth cuspidate-acuminate or spinulose-tipped: calyx bilabiate; corolla barely  $\frac{1}{2}$  in. long, the tube longer than the limb; style and stamens little exserted; connective of stamens with subulate appendages. Calif.

2. **A. nivea**, Benth. Hoary throughout with close tomentum, 3-4 ft. high, shrubby below, leafy: lvs. oblong-lanceolate or the lowest ovate, obtuse, the upper very short-petioled with truncate base; bracts oval or oblong, obtuse: calyx

splitting down the front, finally emarginate on the back; corolla light purple, barely  $\frac{1}{2}$  in. long, the tube only slightly surpassing the calyx; stamens and style long-exserted; connective of stamens almost continuous with filament. Calif.

3. *A. polystachya*, Benth. (*Salvia apiana*, Jepson). WHITE SAGE. Shrubby, 3-10 ft. high, virgately branched, minutely white-tomentose: lvs. oblong-lanceolate, 2-3 in. long, minutely rugose and crenulate, mostly very white: infl. thyrsoid-paniculate; fls. subsessile, loose; upper lip of calyx truncate or 3-toothed, longer than the triangular-subulate lower teeth; corolla pale or white, the tube  $\frac{1}{4}$  in. long; lower lip  $\frac{1}{2}$  in. long, twice the length of the upper; style and stamens long-exserted; connective of stamens filiform, continuous with filament, its lower end usually represented by a very small tooth. Calif.—One of the shrubs called Greasewood.

3. *SALVIA*, L. SAGE. A vast genus with upward of 500 species, widely distributed in the temp. and warmer regions of both hemispheres, furnishing many ornamental subjects and a few grown for culinary or medicinal purposes.—Annual, biennial, or perennial herbs, subshrubs, and shrubs: lvs. entire, variously toothed, incised or pinnatisect; floral lvs. frequently small and bract-like, rarely similar to the cauline: fls. variously colored, rarely yellow, of various sizes, in 2- to many-fl. whorls, spicate, racemose, paniculate or rarely all axillary; calyx commonly 2-lipped, the upper lip entire or 3-toothed, the lower 2-cleft; corolla-tube included or exserted, the limb 2-lipped; stamens inserted on the throat of the corolla, only the lower pair fertile, the upper pair rudimentary or lacking; anther-cells widely separated on a long slender connective articulated with the filament, the upper end of the connective bearing a perfect anther-cell, the lower end with an imperfect one or none: nutlets ovoid, 3-edged or somewhat compressed, smooth. (*Sal-via*: Latin name, used by Pliny, meaning *safe*, *unharméd*, referring to the medicinal properties of some of the species.)

- A. Plants thistle-like, with spinose-toothed lvs. and floral lvs.: fls. blue, showy, in dense head-like clusters..... 1. *S. carduacea*
- AA. Plants not thistle-like, the lvs. and floral lvs. not spinose-toothed.
- B. Fls.  $1\frac{1}{2}$ -2 in. long.
- c. Corolla blue.
- D. St. white-woolly: calyx-teeth acute..... 2. *S. grandiflora*
- DD. St. clothed with stiffish hispid hairs: calyx-teeth setaceous-acuminate..... 3. *S. patens*
- CC. Corolla scarlet (in some vars. purple or white).
- D. Lvs. acuminate, dentate, glabrous..... 4. *S. splendens*
- DD. Lvs. acute, crenate-serrate, pubescent above, white-woolly beneath..... 5. *S. fulgens*
- BB. Fls. seldom over 1 in. long.
- c. Lvs. more or less white-woolly.
- D. Height of plant  $\frac{1}{2}$ -2 ft.
- E. Calyx densely violet- or lavender-woolly: lvs. lanceolate-linear, crenate..... 6. *S. leucantha*
- EE. Calyx not as above: lvs. oblong, entire or finely crenate..... 7. *S. officinalis*
- DD. Height of plant 2-4 ft.: lvs. broad-ovate, sinuate-lobed, the lobes erose-crenate..... 8. *S. argentea*
- CC. Lvs. not at all white-woolly.
- D. Upper st.-lvs. sessile.
- E. Length of fl. 1 in. or sometimes a little more.
- F. Pedicels longer than the calyx..... 9. *S. bicolor*
- FF. Pedicels shorter than the calyx..... 10. *S. pratensis*
- EE. Length of fl. not over  $\frac{1}{2}$  in.
- F. Height of plant 2-3 ft.: lvs. crenate..... 11. *S. nemorosa*
- FF. Height of plant 1-2 ft.: lvs. with angular or sinuate-margined lobes..... 12. *S. verbenaca*
- DD. Upper st.-lvs. petioled.
- E. Floral lvs. large, persistent, the uppermost purple, red, or white.
- F. Base of lvs. mostly rotund or cuneate: calyx tubular..... 13. *S. Horminum*
- FF. Base of lvs. mostly cordate: calyx shortly and broadly campanulate..... 14. *S. Sclarea*
- EE. Floral lvs. small, often early deciduous, seldom colored.
- F. Corolla red or purplish-red,  $\frac{3}{4}$ -1 in. long; floral whorls few-fl. and rather distant.
- G. Tube of corolla not strongly swollen above: lvs. ovate or deltoid, crenate..... 15. *S. coccinea*

- gg. Tube of corolla strongly swollen above: lvs. oblong or spatulate, entire.....16. *S. Greggii*  
 ff. Corolla violet, blue or white, not over  $\frac{3}{4}$  in. long; floral whorls many-fld.  
 g. Floral whorls (except the lower) close together: lvs. serrate or sometimes entire.  
 h. Calyx white or purplish with dense tomentum: floral lvs. mostly caducous.....17. *S. farinacea*  
 hh. Calyx grayish-green, finely puberulent: floral lvs. persistent.....18. *S. azurea*  
 gg. Floral whorls remote: lvs. sinuate-crenate, at base often lyrate-pinnatifid.....19. *S. verticillata*

1. *S. carduacea*, Benth. THISTLE SAGE. Loosely-tomentose thistle-like herb 1-2 ft. high; st. scape-like, erect: lvs. oblong, sinuate-pinnatifid, spinulose-toothed, in a basal cluster: whorls densely many-fld., head-like, 1-1½ in. diam., single or few and remote, subtended and commonly surpassed by a cluster of lanceolate or ovate-lanceolate spinose-toothed bracts giving it a *Carduus*-like or thistle-like appearance; calyx white with long wool, the throat villous, the upper lip 3-toothed and much surpassing the lower, the teeth all spinose-tipped; corolla lavender or bluish-purple, 1 in. long, with a hairy ring inside and with 2-lobed upper and 3-lobed lower lip, the lowest lobe elongate and deeply fringed; connectives directed forward, the anterior portions remote and bearing fertile anther-cells. Calif. where it blooms in spring as a winter annual, especially southward.

2. *S. grandiflora*, Etling. Summer-blooming shrub 2 ft. or more high; st. white-woolly: lvs. petiolate, ovate, 1½-2½ in. long, at base rotund or cordate, finely serrate, acute or acuminate, more or less tomentose: racemes subsimple, the fl.-whorls 6-10-fld. and rather remote; calyx campanulate, membranaceous, often colored, shortly and sparsely hispid, the upper lip 3-toothed, the lower bifid, all acute; corolla blue, nearly 2 in. long, with a hairy ring inside. Asia Minor.

3. *S. patens*, Cav. Perennial herb 1-2½ ft. high, rather densely clothed with stiffish often viscid hairs: lvs. ovate or oblong-ovate, hastate or rounded and subcordate at base, crenulate, obtuse, the lower long-petioled, the upper subsessile; floral lvs. ovate, lanceolate or linear, surpassing the calyx: whorls 2- to few-fld.; calyx campanulate, with setaceous-acuminate teeth, the upper lip often 3-cuspidate; corolla blue, 1½-2 in. long, without hairy ring inside; anterior portion of connectives deflexed, linear. Early autumn. Mts. of Mex.

4. *S. splendens*, Ker (*S. colorans*, Hort.). SCARLET SAGE. Shrub or subshrub, 3 ft. high, glabrous or the infl. villous with colored hairs, cult. as an annual for its masses of brilliant scarlet fls. which bloom in autumn: lvs. petioled, ovate, 2-3½ in. long, acuminate, dentate; floral lvs. and bracts ovate, acuminate, colored: racemes terminal, simple or paniced, the whorls 2-6-fld.; calyx campanulate, scarlet, with 3 broad-ovate acute teeth; corolla scarlet, glabrous or villous, 1½ in. long, without a hairy ring inside; anterior portion of connectives deflexed, linear. Brazil.—There are many vars. common in cult., the fls. varying in color from scarlet to purple, crimson, or even to white.

5. *S. fulgens*, Cav. (*S. cardinalis*, HBK.). CARDINAL SALVIA. MEXICAN RED SALVIA. Shrub to 3 ft. high, the numerous branches almost glabrous or pilose-hirsute: lvs. petiolate, ovate, 1-3 in. long, acute, crenate-serrate, cordate at base, pubescent above, white-woolly beneath; floral lvs. sessile, ovate, deciduous: racemes 6-12 in. long, the rather distant whorls 6-fld.; calyx tubular-campanulate, pubescent; corolla showy scarlet, villous, about 2 in. long, without a hairy ring inside; anterior portion of connectives deflexed, linear. Summer. Mex.

6. *S. leucantha*, Cav. Shrub about 1½-2 ft. high, the branches subterete and white with finally deciduous wool: lvs. short-petioled, lanceolate-linear, acute, crenate, rugose, pubescent above, tomentose beneath; floral bracts ovate, acuminate, shorter than the calyx, deciduous: raceme 6-10 in. long, the whorls many-fld., the lower rather remote; calyx funnel-shaped, with about equal lobes, densely violet to lavender-lanate; corolla white, ⅝-¾ in. long, swollen at the throat, without a hairy ring inside, the limb lanate with upper lip much exceeding the lower; anterior portion of connectives deflexed, linear. Summer. Mex.

7. *S. officinalis*, L. SAGE. Subshrub 6-12 in. high, more or less white-woolly: lvs. petioled, oblong, 1-2 in. long, entire or finely crenate, acute or obtuse, rugose; floral lvs. sessile, ovate to ovate-lanceolate, often acuminate: racemes nearly simple, the fl.-whorls rather few, interrupted, many-fld.; calyx membranaceous, purplish-tinged, campanulate, the 2 lower teeth longer than the 3 upper, all subulate-acuminate; corolla ½-¾ in. long, purple, blue or white, with a hairy ring



inside. Blooming in summer. Medit. region.—Vars. are offered with lvs. variegated with yellow, white or red.

8. *S. argentea*, L. Biennial 2-4 ft. high, with erect villous herbaceous sts.: basal and lower st.-lvs. white-woolly, broad-ovate, sinuate-lobed, the lobes crenate; floral lvs. very broad; panicles divaricate-branched; fl.-whorls remote, 6-10-fld., the uppermost fls. abortive; calyx campanulate, the teeth all subspinose; corolla showy, rose-white, whitish, purplish, or yellowish, about  $\frac{3}{4}$  in. long, without a hairy ring inside, the upper lip much longer than the lower; anterior portion of connectives deflexed, abruptly dilated, connected at extremity. Summer. Medit. region.

9. *S. bicolor*, Lam. Biennial or sometimes perennial, with scarcely branched, leafy, erect herbaceous sts. 2-3 ft. high: lowest lvs. petiolate, broad-ovate, incised-dentate, pinnatifid or palmate-lobate, the upper sessile and lanceolate, all cordate at base and glutinous-pubescent; floral lvs. ovate-lanceolate, acuminate, reflexed; racemes  $1\frac{1}{2}$ -2 ft. long, many-fld., the whorls distinct and about 6-fld., with pedicels longer than the calyx; calyx campanulate, striate, glutinous-hispid, the teeth subulate-acuminate; corolla 1 in. or more long, without a hairy ring inside, the upper lip hooded, bluish-violet dotted with yellow, the lower white changing to a rusty brown; anterior portion of connectives deflexed, abruptly dilated, connected at the extremity. Late spring and summer. Spain and N. Afr.

10. *S. pratensis*, L. Herbaceous perennial 1-3 ft. high, with root sometimes tuberous and sts. erect, pubescent: lvs. more or less blood-red spotted; basal lvs. petiolate, oblong-ovate, obtuse, crenate or incised, cordate at base, rugose, glabrous above, pubescent beneath along the petiole and nerves; st.-lvs. few, sessile; floral lvs. cordate-ovate: racemes nearly simple, viscid, the whorls distant and 6-fld., the pedicels shorter than the calyx; calyx almost sessile, campanulate, viscid-villous; corolla bright blue, rarely reddish or white, 1 in. long, without a hairy ring inside; anterior portion of connectives deflexed, abruptly dilated, connected at the extremity. Summer. Eu.—Numerous vars. are offered whose fls. range from violet to purple, red, light blue, or white, or sometimes variegated.

11. *S. nemorosa*, Crantz (*S. virgata*, Hort., not Ait. *S. virgata* var. *nemorosa*, Hort.). Much-branched perennial 2-3 ft. high, the sts. roughish-pubescent: lvs. lanceolate to oblong, crenate, obtuse or acute, glabrous and rugose above, somewhat pubescent beneath, the basal short-petioled, the cauline sessile and often clasping; floral lvs. ovate, acuminate, shorter than or about equaling the calyx: racemes long, slender, terminating the branches, the many whorls 6-fld., distinct; calyx purplish, hairy, resinous-dotted, 2-lipped, the upper lip shortly and sharply 3-toothed, the lower with 2 longer acerose-tipped teeth; corolla bright violet or purple,  $\frac{3}{8}$ - $\frac{1}{2}$  in. long, without a hairy ring inside, swollen at the throat, the tube little or not at all exerted, the limb more or less profusely resinous-dotted; anterior portion of connectives deflexed, abruptly dilated, connected at the extremity. Summer and autumn. Eu. and W. Asia.—A var. has white fls.

12. *S. verbenaca*, L. Erect perennial herb 1-2 ft. high, the sts. pubescent or villous: lvs. glabrous or nearly so; 2-4 in. long, oblong or ovate, crenately lobed, the lobes angulate or sinuate-margined; lower lvs. petioled, the upper sessile; floral lvs. ovate or rotund-ovate, acuminate: racemes elongate, simple or somewhat branched, the remote whorls about 6-fld.; calyx hairy, 2-lipped, the broad upper lip minutely 3-toothed or entire, the lower strongly cleft into 2 acerose-tipped lobes; corolla blue or rarely white, scarcely  $\frac{1}{2}$  in. long, without a hairy ring inside; anterior portion of connectives deflexed, abruptly dilated, connected at the extremity. Summer and early autumn. Eu. and Orient.

13. *S. Horminum*, L. Erect annual herb, about  $1\frac{1}{2}$  ft. high, more or less villous throughout: lvs. shortly petiolate, oblong to ovate, crenulate, rotund or cuneate at base; floral lvs. very broadly ovate, sessile and acute, nearly as long as the fls., the upper colored or sometimes white: racemes simple, the whorls distant and about 6-fld.; calyx tubular, shortly bilabiate, the upper lip with 3 small unequal teeth, the lower 2-cleft; corolla light lilac or pale violet to reddish-violet or purple, about  $\frac{1}{2}$  in. long, without a hairy ring inside; anterior portion of connectives deflexed, abruptly dilated, connected at the extremity. Summer. (*Horminum*: old Greek name, adopted by Linnaeus.) S. Eu.

14. *S. Sclarea*, L. CLARY. Erect biennial 2-3 ft. high, with stout villous st. glandular above: lvs. hairy, broadly ovate, mostly cordate at base, petiolate, crenate or toothed; floral lvs. very broad, acuminate, colored, their base white, their tips rose: racemes paniced, the fl.-whorls distant, about 6-fld.; calyx broadly campanulate, the upper lip 3-toothed, the lower 2-cleft, the teeth somewhat spiny-

acuminate; corolla whitish-blue, without a hairy ring inside, the tube not exerted from the calyx; anterior portion of connectives deflexed, abruptly dilated, connected at the extremity. Late summer. (Sclarea: Latin for *clear, bright*, in reference to the color of the fls., an ante-Linnæan name.) S. Eu.—The corolla varies to white, pinkish, and purplish in the several vars.

15. *S. coccinea*, L. (*S. rosea*, Vahl). Annual or sometimes perennial and subshrubby, 1–2 ft. high, more or less pubescent or towards the base hirsute with long spreading hairs: lvs. ovate or deltoid, mostly acute, crenate, on long slender petioles; floral lvs. ovate, acuminate-setaceous, seldom equaling the calyx: raceme virgate, the clusters few- to several-fl. and rather distant; calyx tubular-campanulate, the upper lip entire, often purplish, the lower 2-parted, all the teeth acute; corolla deep scarlet,  $\frac{3}{4}$ –1 in. long, without a hairy ring inside, the narrow tube moderately enlarging above, the lower lip twice as long as upper; anterior portion of connectives deflexed, linear. Summer. S. C. to Fla. and Tex., Mex., W. Indies, and trop. Amer.; not to be confused with *S. splendens*.—Fls. varying to white.

16. *S. Greggii*, Gray. Shrub to 3 ft. high, with slender branches, glabrous or the sts. obscurely mealy-puberulent: lvs. petioleate, oblong or spatulate, entire, obtuse or mucronate, fascicled, 1-nerved: racemes loosely few-fl., the ovate floral lvs. falling before the fls. open; calyx narrow-campanulate, the upper lip entire, the lower 2-parted, all the teeth acute; corolla red or purplish-red, 1 in. long, without a hairy ring inside, the exerted portion of the tube strongly swollen, the lower lip large and showy; anterior portion of connectives deflexed, linear. Autumn. (Named for Dr. Josiah Gregg, who collected this species in Saltillo, Mex.) Tex. and Mex.

17. *S. farinacea*, Benth. Minutely puberulent perennial 2–3 ft. high, with numerous clustered sts.: lvs. often somewhat fascicled, the lower ovate-lanceolate to ovate, coarsely and irregularly serrate, obtuse or acute at apex, at base obtuse or narrowed to the slender petiole; upper lvs. lanceolate or linear-lanceolate; floral lvs. mostly caducous: whorls numerous, many-fl., rather close or the lower remote; calyx oblong-campanulate, white or purplish-tinged with soft dense tomentum, the 3 teeth broad and very short; corolla violet-blue,  $\frac{1}{2}$ – $\frac{5}{8}$  in. long, without a hairy ring inside; anterior portion of connectives deflexed, linear. Tex.—Probably including some of the material offered as *S. azurea* var. *grandiflora*.

18. *S. azurea*, Lam. Glabrous or puberulent perennial, branching, 1–6 ft. high: lvs. lanceolate to oblong or linear, obtuse or acute, tapering to a very short petiole, serrate or the upper entire; floral lvs. subulate, small, persistent: infl. elongate, spike-like, composed of numerous many-fl. whorls rather close or the lower remote; calyx oblong-campanulate,  $\frac{1}{4}$  in. long, short-bilabiate, the upper lip very broad and obtuse, the lobes all similar; corolla deep blue varying to white,  $\frac{5}{8}$ – $\frac{3}{4}$  in. long, without a hairy ring inside; anterior portion of connectives deflexed, linear. Summer. S. C. to Fla. and Tex.

19. *S. verticillata*, L. Erect perennial 2–3 ft. high, more or less pilose-hispid throughout: lvs. petioled, broadly ovate, at base cordate or lyrate-pinnatifid, sinuate-crenate, barely acute, often 3 in. long: whorls few-many, densely many-fl., remote, subtended by small bract-like deflexed floral lvs.; calyx with short setaceous-acuminate teeth; corolla lilac-blue, about  $\frac{3}{8}$  in. long, with a hairy ring inside; connectives very short, deflexed and subulate but remote anteriorly. Summer and autumn. Eu., Asia Minor and Caucasus region.

4. **MONARDA**, L. HORSE-MINT. N. American genus, several of the 12–18 species occasionally grown for their showy fls.—Erect aromatic annual or perennial herbs, usually tall: lvs. dentate or serrate: fls. rather large, white, red, purplish, yellowish or mottled, in dense capitate clusters, terminal or sometimes axillary, mostly bracteate, the bracts often highly colored; calyx tubular, narrow, 15-nerved, almost equally 5-toothed, more or less villous or hirsute at the mouth; corolla glabrous within, the tube slightly dilated above, the upper lip erect or arched, the lower lip spreading, 3-lobed with middle lobe largest; perfect stamens 2, usually exerted, the posterior pair rudimentary or wanting, anthers linear; ovary 4-parted. (Monarda: after Nicholas Monardes, Spanish physician and botanist, who in 1571 published a book containing accounts of American products.)

Calyx slightly hairy at throat: st. acutely angled.....1. *M. didyma*  
Calyx densely bearded at throat: sts. mostly obtusely angled.....2. *M. fistulosa*

1. *M. didyma*, L. (*M. coccinea*, Hort.). OSWEGO-TEA. BEE BALM. FRAGRANT BALM. Villous-hirsute becoming glabrous: st. acutely 4-angled: lvs. thin, ovate to ovate-lanceolate, to 6 in. long, acuminate: bracts tinged with red: calyx slightly hirsute in the throat, the teeth narrowly subulate; corolla nearly glabrous, scarlet-red,  $1\frac{1}{2}$ -2 in. long. Late summer or early autumn. Que. to Mich., south to Ga.—A var. has large heads of delicate salmon-pink shade.

2. *M. fistulosa*, L. WILD BERGAMOT. Soft pubescent to glabrate: sts. mostly obtusely angled: lvs. firmer than in *M. didyma*: bracts whitish or rarely purplish, the inner mostly hirsute-ciliate: calyx conspicuously and densely bearded at throat; corolla pubescent, at least on the upper lip, purple or purplish dotted, 1 in. or more long. Late summer and early autumn. Ont. and Vt. to Fla. and Tex., west to B. C. and Ariz.—Crimson, lilac, or deep-purple-fl'd. forms occur.

5. *CUNILA*, L. Known in cult. as a profusely blooming plant used for borders; of the 16 species constituting the genus, 2 are N. American, 2 Mexican, and the others S. American.—Low-growing tufted perennial herbs or shrubs: lvs. usually small: fl.-whorls in loosely corymbed cymes or dense spikes or heads, axillary or terminal; fls. small; calyx 10-13-nerved, equally 5-toothed; corolla white or purplish, 2-lipped; perfect stamens 2. (Cuni-la: Latin name for a mint plant.)

*C. origanoides*, Britt. (*C. mariana*, L.). MARYLAND DITTANY. STONE-MINT. Plant 1 ft. high: lvs. ovate, about 1 in. long, serrate, rounded or cordate at base, nearly sessile, punctate: fls. purplish-pink, about  $\frac{1}{4}$  in. long, in a loose cymose cluster terminating the st. or branchlets, blooming in early autumn; calyx densely bearded in the throat. S. N. Y. to O., south to Fla.

6. *LAVANDULA*, L. Several cult. in flower-gardens, among them the lavender; species upward of 20, Canary Isls. to India.—Perennial herbs, subshrubs or shrubs: lvs. entire, pinnately toothed or dissected: whorls 2-10-fl'd., crowded into long-peduncled cylindric spikes unbranched or branched from base; fls. blue, violet, or lilac; calyx tubular, 13-15-nerved, 5-toothed; corolla-lobes nearly equal or the upper lip 2-cleft and the lower lip 3-cleft; stamens 4, declined, included; style shortly 2-cleft. (Lavan-dula: Latin *lavo*, to wash, referring to the use of lavender in the bath.)

Lvs. entire.

Bracts beneath whorls ovate-acute.....1. *L. Spica*

Bracts linear.....2. *L. latifolia*

Lvs. pinnately dentate.....3. *L. dentata*

1. *L. Spica*, L. (*L. vera*, DC. *L. officinalis*, Chaix). LAVENDER. Subshrub 1-3 ft. high: lvs. oblong-linear or lanceolate, to 2 in. long, entire; younger lvs. often clustered in the axils, white-tomentose, the margins revolute; floral lvs. or bracts rhomboid-ovate, acuminate, short: fls. lavender,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, in 6-10-fl'd. whorls forming interrupted spikes. (Spica: Latin *spike*, as of grain.) Medit. region.

2. *L. latifolia*, Vill. (*L. Spica*, Auth.) Lvs. broader and flat; bracts subtending whorls linear and more herbaceous, usually equaling the calices. Medit. region.

3. *L. dentata*, L. Somewhat shrubby: lvs. pubescent, linear, pinnately dentate,  $1\frac{1}{2}$  in. long, the teeth truncate: spikes long-peduncled; fls. deep purple,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long. Medit. region.

7. *THYMUS*, L. THYME. Small shrubs or subshrubs used for edgings or for rockeries, or the shoots and lvs. sometimes employed for seasoning; species 50, more or less, widely dispersed in temp. climates, the greatest number native to the Medit. region.—Erect or prostrate, with strong mint-like odor: lvs. small, entire; floral lvs. similar or bract-like: floral whorls mostly few-fl'd., axillary and distant or gathered in short loose head-like terminal clusters; bracts minute; calyx ovoid or cylindric, 2-lipped, the broad upper lip 3-cleft or -toothed, the lower lip deeply cut into 2 small or subulate ciliate segms.; corolla-tube included or exserted, the limb somewhat 2-lipped; stamens 4:

nutlets ovoid or oblong, smooth. (Thymus: old Greek name used by Theophrastus either for this plant or for savory.)

- Sts. nearly erect: lvs. sessile.....1. *T. vulgaris*  
 Sts. procumbent: lvs. short-petioled.....2. *T. Serpyllum*

1. *T. vulgaris*, L. COMMON THYME. Suberect, 6-8 in. high, the slender branches stiff and woody, usually white-pubescent: lvs. sessile, linear to ovate, about  $\frac{1}{2}$  in. long, fascicled; floral lvs. lanceolate to ovate: floral whorls loosely several-many-fld., in rather dense head-like clusters on the branchlets or interrupted-racemose-clustered at the ends of the sts.; pedicels slender, about as long as the calyx-tube; fls. resinous-dotted; calyx hairy in the throat, the teeth of the upper lip lanceolate, of the lower lip subulate and ciliate; corolla lilac or purplish, the tube little or not at all exerted. S. Eu.

2. *T. Serpyllum*, L., also spelled *Serpyllus*. MOTHER-OF-THYME. CREEPING THYME. Much-branched perennial, subshrubby, cespitose and creeping, the wiry sts. rooting below, the branches erect or ascending, pubescent: lvs. short-petioled, elliptic, oblong or ovate,  $\frac{1}{2}$  in. or less long, obtuse; floral lvs. similar: floral whorls many-fld., congested into dense terminal heads or the lower rather distant; pedicels about as long as calyx-tube; calyx hirsute, the throat densely white-bearded, the upper lip shortly 3-toothed, the lower with 2 long subulate ciliate teeth; corolla purplish, small, the tube scarcely exerted. (Serpyllum: Greek *creeping*, an ante-Linnean substantive.) Temp. parts of Eu., Asia, and N. Afr.; naturalized in U.S. —There are vars. with white or red fls. and with variegated foliage.

8. *PHYSOSTEGIA*, Benth. FALSE DRAGONHEAD. Perennial herbs native to N. Amer., some grown in borders and in wild-gardens for their showy fls.; about 3 species.—Erect plants almost glabrous, with slender wand-like sts.: lvs. lanceolate to oblong, toothed or serrate, the upper sessile, the lowest tapering into a petiole; floral lvs. small and bract-like, mostly shorter than the calyx: floral whorls 2-fld.; calyx nearly regular and equally 5-toothed; corolla purple, rose or white, the tube gradually inflated upward, the lips short; stamens 4; style 2-cleft: nutlets 3-angled, smooth. (Physostegia: Greek *bladder* and *covering*, referring to the inflated fruiting calyx.)

*P. virginiana*, Benth. (*P. virginica*, Hort. *Dracocephalum virginianum*, L.). Sts. leafy, simple, terminated by a single virgate or sometimes several panicked spikes, to 4 ft. high, forming large clumps in cult.: lvs. oblong to lanceolate, 3-5 in. long, serrate, acuminate; floral lvs. bract-like, lanceolate: infl. finely puberulent; calyx-teeth acuminate; corolla  $\frac{3}{4}$ -1 in. long, purplish red to rose-pink or lilac; flowering in summer. Que. west and south.

9. *STACHYS*, L. WOUNDWORT. Probably 200 species or more, mainly in temp. regions, but a few in the trop. and colder parts, a few sometimes cult. for economic or ornamental purposes.—Herbs or rarely shrubs: lvs. entire, crenate or dentate, the floral lvs. similar or reduced to bracts: floral whorls 2-many-fld., axillary or in terminal spikes; fls. sessile or shortly pedicelled, purplish, scarlet, yellow, or white; calyx tubular-campanulate, 5-10-nerved, 5-toothed, very seldom 2-lipped; corolla-tube cylindric, included or exerted, bilabiate, the expanded lower lip 3-lobed; stamens 4: nutlets ovoid or oblong. (Stachys: from an old Greek name applied by Dioscorides to another group of plants, the word for *spike*.)

- Corolla short, the tube included in calyx or only very slightly exerted.  
 Lvs. oblong-elliptic, densely silky-woolly: fls. purple.....1. *S. lanata*  
 Lvs. ovate or deltoid to ovate-lanceolate, not silky-woolly: fls. whitish  
 or light red.....2. *S. Sieboldi*  
 Corolla two to three times as long as the calyx, the tube exerted.  
 Lowest floral lvs. lanceolate.....3. *S. officinalis*  
 Lowest floral lvs. cordate-ovate.....4. *S. grandiflora*

1. *S. lanata*, Jacq. WOOLLY WOUNDWORT. Perennial 1-1 $\frac{1}{2}$  ft. high, very densely silky-woolly throughout: lvs. petiolate, oblong-elliptic, narrowed at both ends, minutely crenate, rugose; floral lvs. smaller, sessile or nearly so, the uppermost scarcely longer than the fls.: floral whorls many-fld., the uppermost close together, the lower distant; bracts linear-lanceolate, about equaling the calyx; calyx with



slightly unequal teeth; corolla purple, lanate without, the tube not exerted from the calyx. Caucasus to Persia.

2. *S. Sieboldi*, Miq. CHOROGI. CHINESE-OR JAPANESE-ARTICHOKE. KNOTROOT. Erect, hairy, 10-18 in. high, with slender, white, clavate, nodose tubers produced in great numbers just under the surface of the ground: lvs. petiolate, ovate or deltoid-ovate to ovate-lanceolate, cordate at base, obtuse-dentate: fls. small, whitish, in a small spike, the corolla-tube slightly or not at all exerted from the calyx. (P. F. von Siebold, page 87.) China, Japan.

3. *S. officinalis*, Franch. (*S. Betonica*, Benth. *Betonica officinalis*, L.). Perennial herb 1-3 ft. high, somewhat pilose: lower lvs. long-petioled, ovate-oblong, obtuse, crenate, cordate at base, the upper remote; lower floral lvs. sessile, oblong-lanceolate, toothed, acute, the upper linear, entire, equaling the calyx: floral whorls arranged in an oblong spike, somewhat interrupted or the lower distinct; bracts ovate, mucronate; corolla purple, twice as long as the calyx, the tube naked within. Summer. Eu., Asia Minor.—There are vars. with white and rose-colored fls.

4. *S. grandiflora*, Benth. (*S. rosea*, Hort. *Betonica grandiflora*, Willd. *B. rosea*, Hort. *B. spicata*, Hort.). Villous perennial about 1 ft. high: lvs. long-petioled, broadly ovate, obtuse, crenate, broadly cordate at base; floral lvs. similar, sessile, amplexicaul, successively smaller, the uppermost bract-like: floral whorls few, 10-20-fl., distinct, the lower remote; outer bracts similar to the floral lvs., the inner narrower, entire; calyx purplish, with rigid subulate subspinescent teeth; corolla violet, glabrous, the curving tube about 1 in. long and three to four times surpassing the calyx. Asia Minor.—Vars. occur with rose-pink or purple-violet fls.

10. **NEPETA**, L. A large genus comprising 150 species mostly in the northern hemisphere outside the Old World tropics; a few rather commonly cult., some for medicinal purposes, others as ground-cover in shady places. Perennial or annual herbs: lvs. dentate or incised, the floral ones like the others or reduced to bracts: whorls of fls. crowded in a dense spike or in a loose cyme, rarely few-fl. and axillary; fls. mostly blue or white; calyx tubular, 15-nerved, 5-toothed; corolla somewhat 2-lipped, the upper lip straight or erect, the lower spreading and 3-lobed, with the large middle lobe concave; perfect stamens 4, in pairs, the 2 shorter ones in front; ovary 4-parted. (Nep-eta: Latin, perhaps from *Nepete*, an Etrurian city.)

Plant erect: lvs. longer than broad, commonly ovate or oblong-ovate.

Fls. white or nearly so, the corolla-tube scarcely exerted beyond the calyx: larger lvs.  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long..... 1. *N. Cataria*

Fls. blue, the corolla-tube well-exserted: larger lvs. not over  $\frac{3}{4}$  in. long..... 2. *N. Mussini*

Plant creeping: lvs. broader than long, rotund or reniform..... 3. *N. hederacea*

1. **N. Cataria**, L. CATNIP or CATNEP. CATMINT. Erect branching perennial to 3 ft. high, pale green and densely downy: lvs. ovate or oblong-ovate, the larger  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, cordate at base, coarsely crenate, petioled, green above, whitish below: fls. blooming in summer and autumn, the many-fl. clusters spicate-crowded at the ends of the branches, subtended by small floral lvs.; bracts and calyx-teeth slender-subulate, soft; corolla whitish or pale purple, dark-dotted, about  $\frac{1}{4}$  in. long, the tube scarcely exerted. July-Nov. (Cataria: from Latin for *cat*, because of the fondness of cats for this plant.) Eu., Orient.

2. **N. Mussini**, Spreng. Diffusely branched perennial, whitish with soft pubescence or the lvs. green above: lvs. oblong-ovate, not exceeding  $\frac{3}{4}$  in. long, crenate, cordate or narrowed at base: calyx-teeth sharply acute, white-woolly or sometimes blue-woolly; corolla blue with darker spots, about  $\frac{3}{8}$  in. long, the tube well-exserted from the calyx. Summer and autumn. (Bears the name of Count A. Mussini Puschkin, who in 1800-1805 visited the Caucasus in the interests of botany.) Caucasus, Persia.

3. **N. hederacea**, Trev. (*N. Glechoma*, Benth. *Glechoma hederacea*, L.). GROUND-IVY. GILL-OVER-THE-GROUND. FIELD-BALM. Somewhat pubescent perennial, the leafy sts. creeping and making a dense mat: lvs. long-petioled, rotund or reniform, to  $1\frac{1}{2}$  in. across, coarsely crenate, deeply cordate at base: fls. 2-3 together in the lf.-axils, opening in late spring and summer; bracts and calyx-teeth setaceous; corolla light blue, 1 in. long or less; pairs of stamens very unequal. Naturalized from Eu., Asia.—A variegated form is sometimes cult.

11. **COLEUS**, Lour. Herbs or small shrubs, several forms widely cult. in window-gardens and greenhouses because of their variously colored and showy foliage; 90 or more species in the trop. and sub trop. parts of Asia, Afr., Australia and the Pacific Isls.—Annual or perennial, of upright growth: lvs. crenate, dentate or serrate, petioled or sessile: fls. small or medium-sized, mostly blue or lilac, in terminal spike-like racemes which are often branched; calyx 5-toothed, often deflexed in fr.; corolla with tube exserted and bilabiate limb, the lower lip longer than the upper and often inclosing the stamens and pistil; stamens 4, didynamous and declinate, the filaments at base united into a short tube free from the corolla, the anthers confluent: nutlets smooth. (Co-leus: Greek for *sheath*, referring to the monadelphous stamens.)

Peduncles short or nearly none; whorls close. . . . . 1. *C. Blumei*  
 Peduncles, slender, bearing 3—several fls., making loose paniced whorls. 2. *C. thyrsoideus*

1. **C. Blumei**, Benth. Probably to be regarded as an assemblage of forms: soft perennial herb or subshrub, little branched, 2–3 ft. high: lvs. ovate, narrowed or broad at base, sharply and nearly regularly toothed, in some forms lacinate, long-acuminate, variously colored with yellow, dull red and purplish: fls. dark blue or whitish. (Bears the name of K. L. Blume, director of the botanical gardens at Batavia in Java.) Java.—Var. **Verschaffeltii**, Lem. More robust and branchy: lvs. more brilliantly colored, acute, truncate or cordate at base, irregularly cutedentate with rounded teeth giving the margin a crispy effect; the commoner form.

2. **C. thyrsoideus**, Baker. Shrub 2–3 ft. high, with pubescent sts.: lvs. cordate, acuminate, coarsely crenate, the lower 7 in. long: fls. bright blue, in racemes which contain many forking cymes of 3–10 fls. each. Cent. Afr.

12. **MENTHA**, L. MINT. Cult. more or less for the production of the aromatic essential oil present in all parts of the herb; sparingly used for ornamental purposes; species 25–30, all natives of the north temp. zone, about half of them being native or naturalized in N. Amer.—Erect branching herbs, often perennial by leafy runners, stolons or underground rootstocks: lvs. opposite, sessile or petioled: fls. small, in axillary clusters or in terminal spikes or heads, the floral lvs. reduced to small bracts; calyx equally 5-toothed or somewhat bilabiate, the throat naked or hairy within; corolla-limb almost equally 4-lobed, or the upper lobe broader and entire or notched; stamens 4; ovary 4-parted: nutlets ovoid and smooth. (Men-tha: from the Greek name of a nymph, Minthe.)

Whorls of fls. in terminal spikes or some in the upper axils.

Lvs. petioled: spikes thick.

Shape of lvs. lanceolate or ovate-lanceolate, acute. . . . . 1. *M. piperita*

Shape of lvs. mostly ovate or elliptic and obtuse. . . . . 2. *M. citrata*

Lvs. sessile or nearly so.

Plant glabrous: lvs. lanceolate: spikes slender. . . . . 3. *M. spicata*

Plant pubescent or tomentose.

Shape of lvs. elliptic or ovate-oblong, with rounded apex:

spikes slender. . . . . 4. *M. rotundifolia*

Shape of lvs. lanceolate or oblong-lanceolate, acute or short-acuminate: spikes thickish. . . . . 5. *M. sylvestris*

Whorls of fls. all axillary.

Plants usually decumbent or prostrate at base: fls. nearly sessile. . . . . 6. *M. Pulegium*

Plants somewhat rigidly erect: fls. distinctly pedicelled. . . . . 7. *M. arvensis*, var. *piperascens*

1. **M. piperita**, L. PEPPERMINT. Perennial by runners and rootstocks, with strong essential pungent or pepper-like oil (whence the name *piperita*): sts. erect or ascending, 1–3 ft. high, branched, glabrous: lvs. petioled, lanceolate or ovate-lanceolate, 1–3 in. long, sharply serrate, acute, glabrous or pubescent on the veins beneath, punctate with minute oil-globules: fls. in thick terminal spikes 1–3 in. long, in fr. the central spike often finally exceeded by the lateral; calyx resinous-dotted, glabrous below, its sharp teeth usually ciliate; corolla purple, rarely white, glabrous. Eu.

2. **M. citrata**, Ehrh. BERGAMOT MINT. Perennial by leafy stolons, glabrous throughout or nearly so: st. decumbent, 1–2 ft. long, branched: lvs. thin, petioled, broadly ovate or elliptic and obtuse or the uppermost lanceolate and acute: fls.

in the uppermost axils and in short dense terminal spikes; calyx glabrous, with subulate teeth; corolla glabrous. Eu.

3. *M. spicata*, L. (*M. gentilis* and *viridis*, Hort., not of L.). SPEARMINT. Perennial by leafy stolons, glabrous or nearly so: st. erect, with ascending branches, 1-2 ft. high: lvs. sessile or nearly so, lanceolate or ovate-lanceolate,  $2\frac{1}{2}$  in. or less long, sharply serrate: whorls of fls. in narrow interrupted spikes 2-4 in. long, the central spike exceeding the lateral ones; calyx-teeth hirsute or glabrate. Summer and autumn. Eu., Amer.; widely naturalized about old gardens throughout the older settled parts of the U. S.

4. *M. rotundifolia*, Huds. ROUND-LEAVED MINT. Perennial by leafy stolons, pubescent throughout, somewhat viscid: sts. slender, erect or ascending, simple or branched, 20-30 in. high: lvs. sessile, elliptic or ovate-oblong, 1-2 in. long, subcordate at base, mostly obtuse, crenate-serrate, reticulated beneath, a var. with variegated lvs.: fls. in dense or interrupted spikes 2-4 in. long; calyx pubescent; corolla puberulent. Eu.; naturalized from Me. to New Mex.

5. *M. sylvestris*, L. (*M. austriaca*, Hort.). St. erect: lvs. sessile or nearly so, lanceolate to ovate-lanceolate, sharply serrate, acute, pubescent or somewhat tomentose above, white-tomentose beneath: spikes thickish, dense or interrupted at base; calyx villous-tomentose, the teeth linear-setaceous; corolla purplish-pubescent. Eu., Asia.

6. *M. Pulegium*, L. PENNYROYAL. Prostrate, much-branched: lvs. petioled, about  $\frac{1}{2}$  in. long or less, round-oval, entire or slightly crenate, pubescent, in one var. sometimes variegated: fls. small, bluish-lilac, nearly sessile, in dense axillary whorls; mouth of calyx closed by hairs; upper lobe of corolla notched. Late summer and early autumn. (Pulegium: an herbalist name, Latin *flea-bane*, it being supposed to drive away the fleas.) Eu., W. Asia.

7. *M. arvensis*, L., var. *piperascens*, Malinvaud. JAPANESE MINT. Perennial by running rootstocks, puberulent or finely pubescent throughout: sts. somewhat rigidly erect, with numerous branches, 2-3 ft. high: lvs. lanceolate and acute to broadly oblong and obtuse,  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. long, narrowed at base, sharply serrate with low teeth: fls. distinctly pedicelled, in rather loose axillary whorls, usually shorter than the slender petioles; calyx pubescent, its subulate teeth about half as long as the tube; corolla puberulent. The species *M. arvensis* is widely naturalized from Eu., the cult. var. being larger, with larger lvs. and yielding more oil.

13. **IBOZA**, N. E. Br. Represented in the trade by a single showy-fl'd. small shrub or tall herb blooming in winter; more than a dozen species in S. and trop. Afr.—Plant dioecious: bracts and fls. very small, the staminate fls. larger and bearing an abortive ovary or style; calyx minute, 3-lobed; corolla very small, with funnelform tube and more or less unequally 4-5-lobed limb; stamens 4, free and separate; ovary 4-lobed: nutlets erect, oblong or ovoid, dorsally compressed. (Ibo-za: Kafir name.)

**I. riparia**, N. E. Br. (*Moschosma riparium*, Hochst.). Stout perennial 2-5 ft. high, with branching and obtusely 4-angled st.: lvs. broadly ovate, 1-2 in. long, mostly notched at base and coarsely toothed: fls. creamy-white with dark anthers, very numerous, in erect panicles above the foliage; corolla  $\frac{1}{2}$  in. or more long, two to three times longer than calyx, the tube exerted.

14. **ELSHOLTZIA**, Willd. Twenty species in E. and Cent. Asia, south to Java, in Eu. and Abyssinia, a few grown in the flower-garden.—Herbs or undershrubs, usually aromatic: lvs. short-petioled, serrate, often glandular-punctate: fls. small, often minute, in usually one-sided terminal spikes; calyx tubular or campanulate, 5-toothed; corolla 2-lipped or slightly so, lower lip 3-toothed, the upper undivided, emarginate, concave; stamens 4, exerted, anther-cells diverging: nutlets ovoid or ovoid-oblong. (Elsholtz-ia: John Sigismund Elsholtz, 1623-1688, German physician and botanist.)

Lvs. ovate or oblong; floral lvs. ovate.....1. *E. cristata*  
Lvs. narrower; floral lvs. minute, narrow and bracteiform.....2. *E. Stauntoni*

1. **E. cristata**, Willd. Erect branching annual 1- $1\frac{1}{2}$  ft. high, nearly glabrous, aromatic: lvs. ovate to oblong, 1-2 in. long, toothed, narrowed at both ends, the floral lvs. ovate, acute, ciliate, secund, green-membranaceous, surpassing the fls.:

fls. in approximate secund whorls arranged in terminal paniced spikes; calyx ciliate-hirsute; corolla minute, light blue. Asia.

2. **E. Stauntoni**, Benth. Undershrub reaching 5 ft. in height, with terete pubescent branchlets: lvs. ovate-oblong to oblong-lanceolate, 3-5 in. long, acuminate, crenate-serrate, bright green and glabrous above, densely glandular-punctate below, floral lvs. minute and bracteiform: fls. lilac-purple, in dense one-sided spikes 4-8 in. long, usually paniced at the ends of the branches; stamens and style long-exserted. Sept., Oct. (Named for G. L. Staunton, 1737-1801, born in Ireland, physician in London and the E. Indies, later an ambassador to China.) N. China.

15. **PERILLA**, L. Two or 3 herbs in the Himalayas to China and Japan, one sometimes grown for its colored foliage.—Lvs. opposite: fls. small, in axillary or terminal, simple or paniced racemes, each floral lf. subtending a single fl.; calyx campanulate, 5-toothed, in fr. bilabiate and much enlarged and swollen; corolla with short tube not exceeding calyx, the limb oblique and somewhat unequally 5-lobed; stamens 4, erect and distinct; disk represented by a large gland; style 2-parted. (Peril-la: said to be a native name in India.)

**P. frutescens**, Britt., var. **crispa**, Deane (var. *nankinensis*, Bailey). Slightly hairy or rarely glabrous annual: lvs. long-petioled, broad-ovate, acute or short-acuminate, coarsely dentate, narrowed or rounded at base,  $2\frac{1}{2}$ - $4\frac{1}{2}$  in. long, dark purple-brown with a bronzy luster; floral lvs. ovate, shorter than calyx: fls. inconspicuous, borne in racemes and blooming in autumn, the calyx shaggy with long hairs, the white or reddish corolla about  $\frac{1}{4}$  in. long. Himalayas, Burma, China, Japan.—Other vars. of the same species have lvs. wrinkled or crisped and fringed or cut, sometimes variegated.

16. **OCIMUM**, L. Little known in cult. except the basil which is used in seasoning and also grown for its pleasing fragrance; species 50-60 in the warmer parts of the world.—Annual or perennial herbs or small shrubs of variable habit: fls. mostly small, the whorls usually 6-fld. and in terminal or paniculate racemes; calyx deflexed in fr., the teeth unequal, the margin of the broad upper teeth decurrent into the tube; corolla-tube usually not exceeding the calyx, 2-lipped, the upper lip 4-lobed; stamens 4, declined; style shortly 2-cleft: nutlets ovoid or subglobose, smooth or punctate. (Oc-imum: an old Greek name.)

Plant 1-2 ft. high: lvs. glabrous or slightly pubescent.....1. *O. Basilicum*  
Plant 4-8 ft. high: lvs. densely soft-tomentose.....2. *O. suave*

1. **O. Basilicum**, L. **BASIL**. Glabrous or slightly pubescent annual, much branched, 1-2 ft. high, often with purplish foliage: lvs. petioled, ovate, 1-2 in. long, entire or toothed: fls. white or more or less tinged purple, in moderately dense racemes; calyx becoming  $\frac{1}{4}$  in. long; corolla  $\frac{1}{3}$ - $\frac{1}{2}$  in. long; stamens slightly exserted. (Basilicum: old name, Greek *kingly*, because of its healing properties.) Trop. Asia, Afr., and Pacific Isls.—*O. minimum*, L., the Bush Basil, is probably a small cult. form of the foregoing.

2. **O. suave**, Willd. Much-branched shrub to 8 ft. high, woody below: lvs. densely soft-tomentose on both surfaces, ovate, acute, crenate or coarsely toothed: racemes dense and much paniced, becoming 6-9 in. long; corolla whitish or purple tinged, little exceeding the calyx, the latter becoming  $\frac{1}{4}$  in. long. Tree basil of India, Afr., and the E.

17. **COLQUHOUNIA**, Wall. Shrubs cult. to some extent in the S.; the entire genus comprising only 2-4 species native to S. Asia.—Erect or loosely twining, at least the younger parts tomentose: lvs. large, crenate, the floral ones similar or above reduced and bract-like: fls. scarlet, borne in loose few-fld. whorls, these axillary or in a dense terminal spike or raceme; bracts small; corolla-tube exserted, incurved; stamens 4, the anther-cells confluent: nutlets produced at the apex into wings. (Colquhoun-ia: after Sir Robt. Colquhoun; flourished 100 years ago.)



*C. vestita*, Wall. Erect plant to about 4 ft. high, permanently white-woolly: lvs. elliptic or elliptic-ovate,  $1\frac{1}{2}$   $2\frac{1}{2}$  in. long: the orange-scarlet fls. appearing in autumn and winter; calyx-teeth acute; corolla  $\frac{3}{4}$  in. long.

18. **LAMIUM**, L. DEAD NETTLE. Low annual or perennial herbs, one or two sometimes cult. as border plants, the 40 species being native to the Old World.—Commonly diffuse or decumbent at base: lvs. mostly crenate-dentate and petiolate: fls. often rather showy, in axillary or terminal whorls; bracts short; calyx awl-toothed; corolla 2-lipped, the tube somewhat longer than the calyx, the upper lip ascending and concave, the lower one 3-lobed; stamens 4, in 2 pairs, ascending under the upper lip. (La-mium: Greek for *throat*, referring to the shape of the corolla.)

*L. maculatum*, L. (*L. variegatum*, Hort.). Straggling or half-trailing perennial, slightly hairy, the tips of the branches ascending: lvs. long-petioled (except the uppermost), cordate-ovate, 1-2 in. long, obtuse, crenate-dentate, in one var. whitish-blotched along the midrib: fls. appearing in spring and summer, usually purple-red, sometimes varying to white, 1 in. long, ascending in the clusters; corolla-tube two to three times as long as the calyx, hairy within, the upper lip strongly arched or hooded. Eu.

19. **LEONOTIS**, R. Br. LIONS-EAR. About 12 species in trop. and S. Afr., one planted for ornament in the S.—Annual or perennial herbs or shrubs: lvs. ovate to lanceolate, petioled or subsessile: fls. white or yellow, in very dense axillary whorls; calyx 8-10-ribbed, the tube arched and funnel-shaped, the teeth often acrose-tipped; corolla-tube as long as calyx or longer, upper lip long and concave, hairy outside, lower lip deflexed, shorter, the 3 lobes nearly equal; stamens 4, arched; style 2-lobed. (Leono-tis: Greek *lion's ear*, which the fls. are supposed to resemble.)

*L. Leonurus*, R. Br. Shrubby branched perennial 3-6 ft. high, with hairy sts. (a dwarf form not over  $2\frac{1}{2}$  ft. high): lvs. lanceolate or oblong-lanceolate, 2 in. long, obtuse, coarsely serrate, narrowed at base, pubescent: bracts about as long as calyx-tube: corolla  $1\frac{1}{2}$  2 in. long, more than three times the length of the calyx, red-yellow or orange-red (in one form white), the upper lip large and elongate, densely hirsute, the lower small; stamens not exerted. (Leonurus: Linnæan name for the genus under which this species was formerly included: Greek *lion's tail*.) S. Afr.

20. **PHLOMIS**, L. A few of the 70 species are cult. in wild-gardens, native Medit. region to China.—Shrubs or perennial herbs, often more or less woolly: lvs. all similar or the upper bract-like: whorls few- to many-fld., the fls. sessile; calyx regular, truncate or 5-toothed; upper lip of corolla densely hairy, erect or curving over the lower lip, lower lip spreading, with 3 rounded lobes; corolla-tube often with a hairy ring inside; stamens 4, one pair of filaments often appendaged at base; style 2-lobed: nutlets 4, ovoid and 3-angled, glabrous or pubescent. (Phlo-mis: old Greek name.)

Fls. yellow.

Plant 2-4 ft. high: bracts ovate to ovate-lanceolate, mostly shorter than the calyx.....

Plant 1-1½ ft. high: bracts subulate, about equaling the calyx.....

Fls. purple.....

1. *P. fruticosa*, L. JERUSALEM-SAGE. Divaricately branched shrub 2-4 ft. high, the branches floccose-woolly: lvs. ovate or oblong, entire or crenate, rounded or cuneate at base, rugose, white-tomentose beneath; floral lvs. subsessile, scarcely longer than the dense many-fld. floral whorls which are borne singly or in 2's at the ends of the branches; bracts ovate to ovate-lanceolate, mostly surpassed by the calyx; corolla yellow, conspicuous. Blooming in summer in the E., in winter in warm climates. S. Eu.

2. *P. Lychnitis*, L. LAMPWICK PLANT. St. woody at base, erect, 1-1½ ft. high, densely tomentose: lvs. sessile, oblong-linear, 2-3 in. long, clasping, entire, white-tomentose beneath; floral lvs. abruptly dilated at base: bracts subulate,  $\frac{1}{2}$  in. long, about equaling the calyx; calyx-teeth short, subulate; corolla yellow, twice as long

as the calyx. (Lychnitis: referring to the use of the basal lvs. as lampwicks.) S. Eu.

3. *P. tuberosa*, L. Subglabrous herb 3-6 ft. high, with thickened tuber-like roots: lvs. broad-ovate, obtuse, crenate, deeply cordate at base, the lower long-petioled and 8 in. or more long; floral lvs. oblong-lanceolate, coarsely serrate-toothed, at base often hastate-dilated and subincised, 2-3 in. long: floral whorls remote, 30-40-fld., the bracts subulate; calyx-teeth emarginate, tipped with a rigid spine; corolla purple, the upper lip suberect, densely pilose within. S. Eu., E. and N. Asia.

21. *MARRUBIUM*, L. HOARHOUND. HOREHOUND. One of the 30-40 species of Eu., N. Afr., and extra-trop. Asia, is widely naturalized in the U. S. where it is used in large quantities in confections and medicines.—Perennial, branched from base, mostly silky or woolly: lvs. wrinkled, crenate or cut: fls. small, white or purplish, in many-fld. axillary whorls; calyx tubular, 5-10-nerved and with 5 or 10 awl-shaped teeth; corolla 2-lipped, the upper lip erect and notched or entire, the lower spreading and 3-cleft with a broad middle lobe; stamens 4, not exserted; ovary deeply 4-lobed, the style 2-lobed: nutlets smooth. (Marru-bium: ancient name, referring to the bitter qualities.)

*M. vulgare*, L. COMMON HOARHOUND. Aromatic herb 1-3 ft. high, with branched ascending white-woolly sts.: lvs. ovate to round-ovate,  $\frac{1}{2}$ -2 in. long, narrowed to a petiole, tomentose or becoming glabrate above: calyx with 10 short teeth, each terminating in a hooked spine, the alternating ones shorter; fls. whitish, summer-blooming.

22. *MELISSA*, L. Known in cult. from a single species with lvs. having a lemon-like flavor and used in seasoning, particularly in liquors, and also as a medicine; 3-4 species of the Medit. region and Cent. Asia.—Erect perennial herbs, with leafy branched sts.: lvs. broad, toothed: fls. white or yellowish, in axillary clusters; corolla exserted from the long-campanulate calyx, curved, enlarged above and naked within, 2-lipped, the upper lip erect and notched, the lower spreading and 3-lobed; stamens 4, ascending and approximate under the upper lip; style cleft at apex: nutlets smooth. (Melis-sa: Greek *bee*.)

*M. officinalis*, L. LEMON BALM. BEE BALM. Aromatic herb loosely branched, somewhat hairy, 1-2 ft. high: lvs. ovate, to 3 in. long, petioled, narrowed or cordate at base, coarsely crenate-dentate: fls. yellowish or whitish, appearing in late summer; calyx 2-lipped, the upper lip shortly and broadly 3-toothed, the lower with 2 longer acuminate-spinose teeth.

23. *SCUTELLARIA*, L. SKULLCAP. Herbs or subshrubs with often showy fls., sometimes used for outdoor planting; a large genus of 150 or more species, widely distributed, mostly in temp. and mountainous regions.—Annual or perennial, of very various habit: lvs. often dentate, sometimes pinnatifid or entire; floral lvs. similar or bract-like: fls. blue, violet, scarlet, or yellow, opposite in pairs, sometimes in all or in the lower axils, sometimes in terminal racemes or spikes; calyx campanulate, 2-lipped, with short broad entire lips, closed after the corolla falls, finally splitting open to the base; upper lip of calyx with a crest-like projection on the back, often falling away at maturity of fr.; corolla with long-exserted tube, naked within; stamens 4, the anthers hairy: nutlets subglobose or depressed, seldom smooth. (Scutella-ria: Latin *dish*, referring to the form of the persistent calyx.)

*S. baicalensis*, Georgi. Half-erect perennial herb, nearly glabrous,  $\frac{1}{2}$ -1 ft. high: lvs. lanceolate, entire, obtuse, ciliate; floral lvs. similar, longer than the calyx: fls. blue, in many simple racemes; calyx-hood incurved. E. Asia; bears the geographical name Baical.—Var. *cælestina*, Hort. (also as *S. cælestina*, Hort.), has large spikes of bright blue fls. nearly 1 in. long, blooming in summer.

24. *DRACOCEPHALUM*, L. DRAGONHEAD. Forty species in Eu. and Asia, about 4 in N. Amer., sometimes found in flower-gardens.—Annual or

perennial herbs or sometimes woody at base, mostly erect: lvs. entire, toothed or deeply cut, the floral lvs. similar or reduced to bracts: floral whorls axillary or in terminal spikes; calyx tubular, 2-lipped, 5-toothed; corolla purple, blue or rarely white, the upper lip notched and arched, the lower 3-cleft with the middle lobe notched or cleft; stamens 4, the 2 anther-cells divaricate: nutlets smooth. (Dracocephalum: Greek *dragon's head*, from the shape of the corolla.)

—As here considered, the genus includes *Moldavica*, Adans.

- Lvs. entire.....1. *D. Ruyschiana*  
 Lvs. not entire.  
   Whorls of fls. crowded together into spikes or heads.  
     St. pilose above: lvs. nearly glabrous beneath: fls. blue.....2. *D. grandiflorum*  
     St. pubescent above: lvs. pubescent beneath: fls. purplish to deep  
       purple.....3. *D. speciosum*  
     Whorls rather distant, in long racemes.....4. *D. Moldavica*

1. *D. Ruyschiana*, L. Perennial 2 ft. high, with slightly pubescent sts.: lvs. linear-lanceolate, to 2 in. long, entire, glabrous; bracts ovate-lanceolate, ciliate, cuspidate-tipped; calyx finely pubescent, resinous-dotted, the teeth cuspidate-tipped; corolla 1 in. long, blue or bluish or in one var. white shaded with blue, hairy, the tube not exceeding the calyx, the throat funneliform; anthers villous. (Named for Friedr. Ruysch, 1628–1731, professor of botany in Amsterdam.) Siberia.

2. *D. grandiflorum*, L. (*D. altaianse*, Laxm.). Perennial about 1 ft. high, the erect st. somewhat pilose above: lvs. nearly glabrous beneath, the basal long-stalked, oblong, notched at base; st.-lvs. few, short-stalked, ovate, not notched at base, the uppermost still more rounded: whorls of fls. in spikes 2–3 in. long, the lowest whorl somewhat distant; fls. blue, hairy, 2 in. long, two and a half times the length of the calyx. June–July. Siberia.

3. *D. speciosum*, Benth. Perennial 1–1½ ft. high, the sts. pubescent above: lvs. pubescent beneath, wrinkled, the basal broader than in *D. grandiflorum*: fls. purplish to deep purple. June–July. Himalayas.

4. *D. Moldavica*, L. (*Moldavica suaveolens*, Gilib.). Fragrant annual 1–2 ft. high, erect and branching, the branches glabrous or finely pubescent: lvs. lanceolate, to 1½ in. long, blunt, incised-crenate, the lower long-petioled, the upper and floral lvs. short-petioled and toward base bristly-toothed: fls. few in a whorl, the whorls in a long raceme; corolla blue or white, two to three times as long as the calyx. July–Aug. (First described under the old genus *Moldavica*, named from Moldavia, formerly a province along the Danube.) Eu., N. Asia.

25. **ORIGANUM**, L. MARJORAM. Perennial herbs, one cult. for its aromatic herbage and its purple-pinkish spikes of fls.; 5–7 species in the Medit. region.—Lvs. entire or toothed: fls. in small erect spikes with ovate or lanceolate green or colored bracts, the spikes more or less corymbosely or paniculately clustered; calyx ovate-campanulate, equally 5-toothed, with bearded throat; corolla with more or less exserted limb, the upper lip erect, the lower outspread and 3-lobed; stamens 4, exserted; style unequally 2-lobed: nutlets ovate, smooth. (Orig-anum: ancient Greek name, said to mean *delight of the mountains*.)

*O. vulgare*, L. WILD MARJORAM. Erect aromatic herb 1–2½ ft. high, the sts. more or less hairy, the rootstocks nearly horizontal: lvs. petiolate, broadly ovate, to 1½ in. long, subserrate or entire, broadly rounded or subcordate at base, acute or blunt at apex: fls. borne in summer, purplish (varying to pink or nearly white), in corymbd clusters or short spikes; bracts purplish, glabrous, about the length of the calyx; corolla longer than calyx; stamens all or only 2 exserted. Eu.—A var. has golden or yellow foliage.

26. **MAJORANA**, Moench. Perennial herbs or undershrubs, chiefly of the Orient, with aromatic herbage; about 6 species, two in cult.—Mostly tomentose: lvs. entire or toothed: floral whorls in thick clustered spikes; bracts not colored, densely white-hairy; calyx-limb oblique, the lower lip small or poorly developed; corolla with short limb, the upper lip erect, the lower outspread, 3-lobed; stamens 4, exserted or included; style somewhat unequally 2-lobed: nutlets ovoid, smooth. (Majora-na: derivation uncertain.)

|                    |                        |
|--------------------|------------------------|
| Lvs. petioled..... | 1. <i>M. hortensis</i> |
| Lvs. sessile.....  | 2. <i>M. Onites</i>    |

1. *M. hortensis*, Moench (*Origanum Majorana*, L.). SWEET MARJORAM. ANNUAL MARJORAM. Perennial 1-2 ft. high, cult. as an annual: lvs. petiolate, elliptic,  $\frac{1}{4}$ -1 in. long, entire, broadly obtuse, tomentose: spikelets oblong, 3-5 in a cluster; bracts not prominently colored; calyx oblique. Eu.

2. *M. Onites*, L. (*Origanum Onites*, L.). Perennial: sts. erect, nearly simple, hirsute: lvs. sessile, ovate, slightly serrate, villous or tomentose, mostly cordate at base: fls. as in *M. hortensis* but a little larger; spikelets ovoid, very numerous in a dense cluster. (Onites: ante-Linnæan substantive name.) S. E. Eu., Asia Minor, Syria.

27. *MOLUCELLA*, L. Two species of the Medit. region, sometimes found in old-fashioned gardens.—Annual herbs with petiolate lvs. toothed or cut: fls. axillary, borne in whorls of 6-10; bracts subulate, spinose; calyx campanulate, the limb broadly dilated; corolla white, tipped pink, scarcely if at all thrust out of the calyx, the tube with oblique hairy ring within, the upper lip erect, the lower trilobed with broad notched middle lobe; stamens 4, ascending under the hood, the anthers attached by lateral pedicels to the tip of the filament, the cells divergent; style bifid: nutlets 4, convex on one side, angular on the other, broader upward, truncate. (Molucel-la: diminutive of Molucca.)

|                                     |                      |
|-------------------------------------|----------------------|
| Calyx not prickly.....              | 1. <i>M. lævis</i>   |
| Calyx beset with long prickles..... | 2. <i>M. spinosa</i> |

1. *M. lævis*, L. SHELL-FLOWER (so-called because of the shell-like calyx in which the seeds nestle like eggs). MOLUCCA-BALM. St. simple or branching below, 2-3 ft. high, fl.-bearing almost from base: lvs. long-petioled, rounded-subcordate,  $\frac{3}{4}$ -1  $\frac{1}{4}$  in. long, with coarse rounded teeth: fls. fragrant, in 6-fld. whorls; bracts shorter than calyx-tube; calyx with large spreading membranaceous border, inconspicuously 5-angled, with 5 small thorns; corolla white, shorter than calyx. W. Asia.

2. *M. spinosa*, L. Annual or biennial 6-8 ft. high, with brownish-red sts.: lvs. ovate, deeply and sharply cut: fls. white, in 6-10-fld. whorls; bracts subulate, spiny, shorter than calyx-tube; calyx with moderately spreading border, with 1 long spine above and 7 others below; corolla gaping, the limb longer than the calyx-tube. S. Eu., Syria.

28. *AJUGA*, L. BUGLE-WEED. Annual or perennial herbs, a few considerably used in rock-gardens and for border planting; the 30-40 species widely distributed but especially numerous in the Orient.—Herbaceous or occasionally with somewhat woody base, often decumbent or stoloniferous: lvs. coarsely toothed or incised or rarely entire, the floral similar or reduced to bracts: spikes terminal, consisting of 2- to many-fld. whorls, dense or interrupted below; fls. blue, white, or rose, 2 to many sessile in the axils of the floral lvs., the corolla withering and often persisting in fr.; stamens 4. (Aju-ga: *not yoked*, the calyx not bilabiate.)

|  |                         |
|--|-------------------------|
| Plant not stoloniferous: st. erect, grayish with long jointed hairs..... | 1. <i>A. genevensis</i> |
| Plant stoloniferous: st. prostrate, glabrous or nearly so.....           | 2. <i>A. reptans</i>    |

1. *A. genevensis*, L. (*A. rugosa*, Hort. *A. alpina*, Hort.). Five to 14 in. high, not stoloniferous, the erect st. grayish with long jointed hairs: lvs. mostly crenate-dentate, the lower oblong-elliptic or obovate, to 3 in. long, petioled or narrowed to a subsessile base, rounded at apex, the upper and floral ones ovate or cuneate, sessile, all sparsely hairy: fls. in spiked whorls, the lower whorls distant, the upper close; fls. blue, blooming in early summer; corolla exserted. Eu., Orient.

2. *A. reptans*, L. Four to 12 in. high, stoloniferous, the st. more or less prostrate, glabrous or nearly so: lvs. entire or repand, the basal and cauline oblong-elliptic or obovate, narrowed to a margined petiole, rounded at apex, the upper and floral ones elliptic or ovate, sessile: lower whorls of spike distant, the upper close; fls. white or in some vars. blue or purplish, blooming in early summer; corolla exserted. Eu.—Certain vars. have lvs. dark purple or splashed and edged creamy-yellow.



29. **TEUCRIUM**, L. GERMANDER. Herbs, subshrubs, or shrubs with leafy branches of rather showy fls., rarely cult.; over 100 species widely distributed through warm and temp. regions.—Lvs. entire, dentate or incised; floral lvs. similar or reduced to bracts: floral whorls 2- to rarely many-fl'd., in racemose spikes or heads; calyx tubular or campanulate, seldom inflated, 5-toothed; corolla-tube included or rarely exserted, limb seemingly 1-lipped, with lower lip large and upper lip small and deeply cleft; stamens 4, strongly exserted between the lobes of the upper corolla-lip: nutlets obovoid, reticulate, rugose. (Teu-crium: Teucer was the first king of Troy.)

Lvs. entire, more or less white-tomentose: fls. blue.....1. *T. fruticans*  
Lvs. crenate- or serrate-toothed, green, pubescent: fls. red-purple or  
rose.....2. *T. Chamædrys*

1. ***T. fruticans***, L. Shrub to 3 ft. high, divaricately branched, covered with a dense white or yellowish tomentum which is more or less deciduous from the older lvs.: lvs. petioled, ovate, obtuse,  $1\frac{1}{4}$  in. long, with entire revolute margin; floral lvs. similar but smaller: fls. in racemes terminating the sts. or on short lateral branches; pedicels shorter than calyx; calyx broad-campanulate, the tube and the 5 broad lobes of about equal length; corolla blue, with long declined lower lip; stamens of about the same length, erect or strongly recurved. Eu.—Has a long blooming season.

2. ***T. Chamædrys***, L. Perennial, often shrubby, 1-2 ft. high, decumbent at base, branching, pubescent or villous: lvs. short-petioled, ovate or oblong,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, often rather deeply serrate- or crenate-toothed, cuneate at base; floral lvs. smaller, often subentire: floral whorls 2-6-fl'd., the upper racemose; fls. red-purple or bright rose with red and white spots,  $\frac{3}{4}$  in. long, rather showy; calyx tubular-campanulate, with lanceolate acuminate teeth. Eu.—Blooming in late summer and used as a border plant. Probably sometimes appearing in the trade as *T. canadense* which, however, has lvs. 2-3 in. long.

30. **HYSSOPUS**, L. HYSSOP. A single species of Eu. and temp. Asia, grown for ornament in borders; also used for medicinal purposes and occasionally as a pot-herb.—Perennial subshrub: lvs. entire: floral whorls in leafy-bracteate spikes; calyx tubular, 15-nerved; upper corolla-lip 2-lobed, the lower 3-lobed; stamens 4: nutlets ovoid and somewhat 3-sided, smooth. (Hysso-pus: ancient name; but precisely what plant was the sacred hyssop of the Jews is uncertain.)

***H. officinalis***, L. Sts. herbaceous from a woody base, slender,  $1\frac{1}{2}$  ft. high, simple or branching: lvs. linear to oblong,  $1\frac{1}{2}$ -2 in. long, sessile or nearly so, acute at both ends or the lower obtuse at the apex: floral whorls secund, in terminal spikes; fls. blue or in one var. white; corolla exserted; stamens and pistil well exserted.

31. **SATUREIA**, L. SAVORY. Aromatic herbs and subshrubs grown in borders and also as pot-herbs; about 130 species in the warmer regions of both hemispheres.—Lvs. narrow and entire or broader and toothed; floral lvs. similar or sometimes smaller: floral whorls few- to many-fl'd., the infl. simple and subspicate, more or less racemose-paniculate; calyx tubular-campanulate or tubular, 5-toothed or sometimes 2-lipped; corolla-tube short or long, exserted or scarcely so, the upper lip flat and entire or emarginate, the lower lip expanded, 3-cleft; stamens 4: nutlets ovoid, smooth. (Sature-ia: old Latin name for savory.)

Lvs. subrotund or ovate, subserrate, distinctly petioled.....1. *S. alpina*  
Lvs. oblong, linear, or oblanceolate, entire, sessile or nearly so.  
Branches rather densely white-pubescent: opposite lf.-bases not joined  
by a ridge.....2. *S. hortensis*  
Branches mostly minutely pubescent: opposite lf.-bases joined by a  
ridge.....3. *S. montana*

1. ***S. alpina***, Scheele (*Calamintha alpina*, Lam.). Diffuse perennial, pubescent or villous, much branched and somewhat woody at base, about 6 in. high: lvs. petioled, subrotund or ovate, subserrate, not over  $\frac{1}{2}$  in. long; floral lvs. sometimes

narrower: floral whorls 4-6-fld., the pedicels short; calyx ribbed, hairy in the throat, narrowed below the sharp rigid-tipped teeth; corolla purple, about twice as long as calyx, with strongly dilated throat. *Medit. region.*

2. *S. hortensis*, L. (*Calamintha hortensis*, Hort.). SUMMER SAVORY. Annual herb about  $\frac{1}{2}$ -1 $\frac{1}{2}$  ft. high, with rather densely pubescent erect branching sts.: lvs. oblong-linear, entire, acute, narrowed to a sessile base or a short petiole; floral lvs. similar: floral whorls about 6-fld., in subspicate infl. which is dense above, interrupted and somewhat branched below; calyx resinous-dotted, the teeth acuminate, hispid-ciliate, about as long as the tube; corolla little longer than the calyx. *Eu. and widely escaped from cult.*

3. *S. montana*, L. (*Calamintha montana*, Lam.). WINTER SAVORY. Glabrous or finely hispid subshrub, woody at base, 6-15 in. high, with minutely pubescent branches erect or ascending: lvs. hispid-ciliate, sessile, oblong-linear or oblanceolate, entire, acute or the lower obtuse; upper and floral lvs. narrower: floral whorls few- to many-fld., loosely racemose-paniculate; calyx and corolla resinous-dotted; throat of calyx bristly, the teeth long-acuminate, longer than the tube; corolla white or purplish, the tube little or not at all exserted. *Eu., N. Afr., and widely cult.*

### 150. NOLANACEÆ. NOLANA FAMILY

Herbs or small shrubs of 3 genera and about 50 species native in Chile, Peru, and Bolivia, many of them maritime.—Lvs. alternate or in pairs: fls. solitary, bisexual, regular; calyx 5-cleft; corolla gamopetalous, hypogynous, 5-lobed, plicate in the bud; stamens 5, alternating with lobes of corolla and inserted in the base of it; disk present, often lobed; ovary superior, usually of 5 carpels which are radially or transversely lobed and split into 5-30 nutlets or follicles which are 1-7-seeded.

**NOLANA**, L. About 20 species of prostrate annual herbs from Chile and Peru, one suitable for planting in borders, rocky hillsides, and baskets.—Technical characters as for the family. (*Nola-na: nola*, a little bell, referring to the shape of the corolla.)

*N. atriplicifolia*, D. Don. Sts. spotted and streaked with purple above, to 1 ft. or more long: lvs. fleshy, spatulate, the lower ones with petioles 2-3 in. long, the upper with short broad ciliate petioles (more or less atriplex-like: *atriplicifolia*): fls. blue with white throat which is yellow within, 1-2 in. across, on long slightly hairy peduncles; corolla-lobes angular, each with 3 straight branched ribs; stamens unequal, villous at base; ovaries numerous, 1-seeded, surrounded at base by an annular nectary.

### 151. SOLANACEÆ. NIGHTSHADE FAMILY

A great family abounding in the tropics but well represented also in temp. regions, of 75 or more genera and more than 2,000 species, yielding many subjects for ornament as also for food and drugs.—Erect or climbing herbs, shrubs, or small trees, with mostly alternate entire or variously dissected or pinnate exstipulate lvs.: fls. mostly bisexual and regular, with valvate or plicate æstivation, 5-lobed, the gamopetalous corolla prevailingly rotate but varying greatly in its shape and structure, sometimes very irregular; calyx 5-lobed; stamens typically as many as lobes of corolla and alternate with them, often connivent by their anthers, sometimes 1 or more of them sterile; hypogynous disk usually present; family marked by the superior normally 2-celled ovary with axile placentæ together with usually plicate or valvate corolla-lobes, the ovules mostly many, style 1 and stigma simple or lobed: fr. a berry or caps. *H*, Fig. 12, page 570.—The family has many poisonous members.

a. Stamens all fertile and not didymous (twin), usually 5.

b. Fr. a berry (sometimes very large) or at least not capsular and not dehiscent.

c. Anthers connivent around the style.

d. Two cells of anthers close together and parallel, not separated by a broadened filament or connective.

- E. Opening of anthers mostly by a pore or slit at or near the apex..... 1. SOLANUM  
 EE. Opening from base to top, the apex extended into an empty extremity..... 2. LYCOPERSICON  
 DD. Two cells separated by a prominently broadened or thickened filament or connective..... 3. CYPHOMANDRA  
 CC. Anthers not connivent around style, dehiscing longitudinally.  
 D. Calyx enlarging in fr.  
 E. Plants herbaceous: fls. rotate or at most funnellform.  
 F. Fruiting calyx spreading, about as long as fr..... 4. ATROPA  
 FF. Fruiting calyx bladdery-inflated, permanently inclosing the berry..... 5. PHYSALIS  
 EE. Plants woody: calyx appressing or inclosing the berry: fls. long-tubular, with narrow limb..... 6. IOCHROMA  
 DD. Calyx not so: mostly woody plants.  
 E. Nodes bearing spines.  
 F. Berry with 2 2-celled stones, each cell 1-2-seeded..... 7. GRABOWSKIA  
 FF. Berry with 2 regular cells, each of which is 1- to many-seeded..... 8. LYCIUM  
 EE. Nodes not spiniferous.  
 F. Fls. 2 in. or less long: not true climbers.  
 G. Corolla rotate or bell-shaped.  
 H. Foliage radical: root very large..... 9. MANDRAGORA  
 HH. Foliage cauline and root fibrous..... 10. CAPSICUM  
 GG. Corolla distinctly tubular or cylindrical or urn-shaped.  
 H. Ovules (and seeds) 3-6 in each cell, some of them usually abortive in fr..... 11. CESTRUM  
 HH. Ovules many in each cell..... 12. SALPICHROA  
 FF. Fls. very large, corolla 4 in. or more long: tall climber..... 13. SOLANDRA  
 BB. Fr. capsular, mostly dehiscent or at length splitting.  
 C. Foliage heath-like..... 14. FABIANA  
 CC. Foliage wholly otherwise.  
 D. Caps. opening by a lid (circumscissile)..... 15. HYOSCYAMUS  
 DD. Caps. splitting lengthwise or bursting irregularly.  
 E. Calyx nearly or quite covering the fr..... 16. NICOTIANA  
 EE. Calyx much shorter than fr., mostly reflexing..... 17. DATURA  
 AA. Stamens paired, one or more of them often smaller or abortive.  
 B. Perfect stamens 5.  
 C. And affixed at top of tube..... 18. NIEREMBERGIA  
 CC. And affixed at middle of tube or lower..... 19. PETUNIA  
 BB. Perfect stamens 4.  
 C. Anthers with all cells developed.  
 D. Fr. a dry caps: herb viscous-pubescent..... 20. SALPIGLOSSIS  
 DD. Fr. fleshy, more or less berry-like: woody, not viscid..... 21. BRUNSFELSIA  
 CC. Anthers with 1 cell in each of shorter pair not developed.  
 D. Tube of corolla straight and cylindrical..... 22. BROWALLIA  
 DD. Tube twisted, broadened at throat..... 23. STREPTOSOLEN  
 BBB. Perfect stamens 2..... 24. SCHIZANTHUS

1. **SOLANUM**, L. NIGHTSHADE. One of the largest genera of plants, of which about 1,200 species are described, in temp. and trop. climates around the world, yielding a good number to hort. and agriculture.—Herbs, shrubs, sometimes trees, many of them climbing, some species strongly spiny, often with stellate pubescence: lvs. alternate, simple or compound: infl. mostly super-axillary or opposite the lvs., the buds before anthesis commonly drooping: fls. gamosepalous and gamopetalous, corolla mostly rotate or shallowly bell-shaped and plaited in the bud, white, blue, purple, yellow, often showy; stamens typically 5, inserted on throat of corolla, the anthers connivent in a cone about the pistil and mostly opening at the apex; ovary prevailingly 2-celled, many-ovuled; stigma small: fr. a berry. (*Solanum*: said to be from Latin *solamen*, quieting, alluding to sedative qualities.)—Some of the coarse species are grown in the open for their bold foliage effect, others for their showy fls. and frs.; others for edible parts. Other species than those here described may be in cult. here and there. The common weedy bittersweet, *S. Dulcamara*, L., is ornamental in its brilliant red ovoid berries, which are poisonous.

- A. Species not climbing.  
 B. Kinds grown for the subterranean tubers..... 1. *S. tuberosum*  
 BB. Kinds grown for the edible fr.  
 C. Fr. small, in clusters, size of cherry or less..... 2. *S. nigrum*  
 CC. Fr. large, maturing singly.

- D. Lvs. narrow, finely pubescent or silky..... 3. *S. muricatum*  
 DD. Lvs. broad-ovate or broader, mostly scurfy or coarsely-pubescent..... 4. *S. Melongena*  
 BBB. Kinds grown for ornament or curiosity (Nos. 3 and 4 sometimes qualify in this category.)  
 C. Plant without spines.  
 D. Herbage not tomentose.  
 E. Fls. violet or purple, 1 in. or more across..... 5. *S. Rantonnettii*  
 EE. Fls. white,  $\frac{1}{2}$  in. or less across.  
 F. Twigs glabrous..... 6. *S. Pseudo-Capsicum*  
 FF. Twigs stellate-pubescent..... 7. *S. Capsicastrum*  
 DD. Herbage densely tomentose..... 8. *S. auriculatum*  
 CC. Plant spiny.  
 D. Lvs. 2-pinnatifid..... 9. *S. cornutum*  
 DD. Lvs. entire or variously lobed, not pinnatifid.  
 E. Young parts and under surface of lvs. rusty-tomentose.  
 F. Sts. strongly winged..... 10. *S. robustum*  
 FF. Sts. not winged..... 11. *S. Warscewiczii*  
 EE. Young parts and lvs. with gray or whitish pubescence.  
 F. Shoots and under side of lvs. felty-white..... 12. *S. marginatum*  
 FF. Shoots and lvs. with thin stellate pubescence..... 13. *S. integrifolium*  
 AA. Species of climbing plants.  
 B. Without prickles.  
 C. Lvs. small, upper ones entire..... 14. *S. jasminoides*  
 CC. Lvs. 4 in. or more long, mostly pinnate or pinnatifid..... 15. *S. Seaforthianum*  
 BB. With prickles on lvs. and sts..... 16. *S. Wendlandii*

1. *S. tuberosum*, L. POTATO. Herbaceous from underground st.-tubers, the weak pubescent or glabrate sts. 1-3 ft. long: lvs. odd-pinnate, 4-10 in. long, with 3 or 4 pairs of ovate pointed entire lfts. with smaller ones between: fls. few in long-peduncled forking clusters, white to bluish, 1-1  $\frac{1}{4}$  in. across, the corolla rotate; calyx-lobes linear-lanceolate, about one-third length of corolla: fr. (infrequently produced) a 2-celled or 3-celled globular berry  $\frac{3}{4}$  in. or less diam., yellowish or green. Temp. Andes.

2. *S. nigrum*, L. A prostrate, ascending or erect glabrous or somewhat pubescent variable branchy weed of world-wide distribution, but certain forms cult. for the large edible berries and then known as Morelle, Garden Huckleberry, Wonderberry, Sunberry; the lvs. are eaten as greens in some countries: lvs. simple, usually ovate or lance-ovate, 2-5 in. long or often longer in the cult. plant, pointed, entire or variously angled, petioled: fls.  $\frac{1}{2}$  in. or less across, white, in pendulous lateral little clusters: berries black, about  $\frac{1}{4}$  in. diam. or perhaps twice as large in the cult. kinds: annual, or perhaps of longer duration in warm climates, 1-2  $\frac{1}{2}$  ft. high; perhaps more than one species is involved in the multitude of forms.

3. *S. muricatum*, Ait. PEPINO. Erect spiny perennial herb or subshrub, 2-3 ft., finely pubescent to glabrate: lvs. simple, entire or margins undulate, oblong-lanceolate to lance-ovate, 3-6 in. long, tapering to obtuse or acutish apex, long-petioled: fls. in a long-peduncled cluster, about  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, bright blue, the corolla deeply 5-lobed and puberulent outside: fr. ovoid and usually with a point, 4-6 in. long and hanging on a long peduncle, yellow with splashes and streaks of violet-purple, flesh yellow and seedless in cult., acid, aromatic, long-keeping, edible, with a melon-like quality (plant sometimes called Melon Shrub). Probably Peru; now and then cult. in the U. S., largely as a curiosity.

4. *S. Melongena*, L. Erect and much-branched stout herb or subshrub, probably native in S. Asia, not in cult. unless in botanic gardens. (Melongena: a pre-Linnæan name, perhaps associated with the Greek word for apple.)—Var. *esculentum*, Nees. COMMON EGGPLANT. Bushy erect perennial grown commonly as an annual, 2-3 ft., gray-tomentose and more or less scurfy, sometimes with a few spines: lvs. simple, oblong, oval or ovate, 6-15 in. long, thick and heavy, unequal at base, acute or obtuse at apex, obscurely angled or lobed: fls. mostly solitary, opposite the lvs. or subopposite, inclined or nodding, 1  $\frac{3}{4}$ -2 in. across, violet, rotate, the calyx usually prickly: fr. a large pendent ovoid, oblong or obovoid berry, 2-12 in. long, shining, purple, white, yellowish, or striped. Var. *serpentinum*, Bailey. SNAKE EGGPLANT. Differs in its fr., which is a curiosity, to 12 in. long and only 1 in. or less thick, curled at the end. Var. *depressum*, Bailey. DWARF EGGPLANT. Small and straggling plant nearly or quite glabrous and the young parts usually purplish, mostly spineless: lvs. only 2-6 in. long, thin, scarcely lobed: fls. small and long-peduncled: fr. pyriform to obovoid, 4-5 in. long, purple.

5. *S. Rantonnettii*, Carr. Erect puberulent or glabrate shrub, 3-6 ft., with ridge-lines on the sts.: lvs. simple and entire but margins more or less undulate, ovate, lance-ovate to elliptic, 1-4 in. long, acute or obtuse, narrowed to slender



petiole, mostly puberulent at least on veins: fls. few, slender-pedicelled, in axillary nearly or quite sessile clusters, about 1 in. across, potato-like, dark blue or violet and usually with a lighter center: berries drooping,  $\frac{1}{2}$ –1 in. long, heart-formed, red. Paraguay, Argentina; grown as a novelty the middle of last century in France by Mons. Rantonnet.

6. *S. Pseudo-Capsicum*, L. JERUSALEM-CHERRY. Widely distributed small branching erect shrub, 2–4 ft., glabrous: lvs. narrow-oblong to oblanceolate, 2–4 in. long, obtuse or only short-acute, narrowed to a short petiole, entire but more or less undulate, glabrous both sides, upper surface shining: fls. white,  $\frac{1}{2}$ – $\frac{1}{2}$  in. across, solitary or few, lateral: fr. globular, size of cherry, scarlet or yellow, long-persistent and therefore giving the plant a highly ornamental character. (*Pseudo-Capsicum*, *false Capsicum*, is an ante-Linnæan name for the plant.) Probably of Old World origin.

7. *S. Capsicastrum*, Link. Much like No. 6 but differing in the stellate pubescence or light tomentum on the young parts, pedicels, and under surfaces of lvs., giving the plant a grayish not shining appearance: lvs. often 2 together, one large and one small, the larger ones 2–3 in. long, sometimes variegated: fr. usually ovoid and somewhat pointed, scarlet or orange-red, relatively not long-persistent. (*Capsicastrum*: *Capsicum*-like.) Brazil.

8. *S. auriculatum*, Ait. Stout plant, becoming a shrub, 10–20 ft., the young growth, infl. and under sides of lvs. velvety white-tomentose, spineless: lvs. simple and entire, ovate-oblong and acuminate, 6–8 in. long, thick, the axils with small orbicular-oblong lvs. like stipules: fls. many in a subterminal corymb, the violet or bluish-white corolla about  $\frac{1}{2}$  in. across and pubescent outside: fr. a globular berry about the size of a cherry. Trop. Afr., and elsewhere distributed.—*S. verbascifolium*, L., is similar and likely to be found in yards far S.: it has no secondary little lvs. in the axils. Trop. Amer., as far north as S. Fla.

9. *S. cornutum*, Lam. Annual, branching above the base, very prickly, pubescent,  $1\frac{1}{2}$ –4 ft.: lvs. oblong in outline, 4–5 in. long, 2-pinnatifid, the ultimate segms. and the sinuses rounded, the long petiole, rachis and ribs with straight yellow prickles, pubescent above and stellate-pubescent beneath: fls. yellow, 1 in. or somewhat more across, 3–12 of them in a cluster; 1 anther horned: fr. small, prickly. Mex.

10. *S. robustum*, Wendl. (*S. alatum*, Seem. & Schmidt). Strong shrub, 3–5 ft. or more, with strongly winged sts. and strong spines, the growing parts and under surfaces of lvs. rusty-tomentose: lvs. simple, sinuately lobed or angled, ovate-elliptic in outline, 10–12 in. and more long, the ribs and the long winged petiole spiny, puberulent above with forked and stellate hairs: fls. few to several in rather close rusty-tomentose lateral peduncled clusters, white, 1 in. or more across, the corolla-lobes narrow and acute: fr. globose, about  $\frac{1}{2}$  in. diam., with rusty tomentum. Brazil.

11. *S. Warscewiczii*, Weick. Strong shrub, 4–6 ft., much like No. 10 but without winged sts., and lvs. with several narrow lobes on either side sometimes extending half or more the width of the blade: corolla white,  $1\frac{1}{2}$  in. across: fr. pale yellow, glabrous, shining. (Von Warscewicz, p. 206.) Probably from S. Amer.

12. *S. marginatum*, L. f. Shrub, 3–4 ft., the young growth and under side of lvs. densely white-tomentose with felted stellate hairs, bearing many straight strong spines: lvs. oval to oblong-ovate, simple but shallowly sinuate-lobed with rounded parts, 4–8 in. long, the heavy frost-like pubescence on the upper surface disappearing except near the margin: fls. white with more or less bluish ribs, about 1 in. across, the calyx spiny: fr. globose, yellow,  $1\frac{1}{2}$  in. diam., spiny. Nile Land and Abyssinia.

13. *S. integrifolium*, Poir. (*S. corcineum*, Hort.). SCARLET or TOMATO EGG-PLANT. Annual coarse herb, branched, 3 ft., the growing parts pubescent and scurfy, with strong hooked spines: lvs. ovate to oblong-ovate, simple, sinuate-lobed to one-third or less width of blade, 4–8 in. long, more or less spiny on ribs and petiole, becoming glabrate above, stellate-pubescent or tomentose beneath: fls. white, in short-peduncled clusters of 2–6, about  $\frac{3}{4}$  in. across, the calyx prickly: fr. globular but usually flattened on the ends, 1–2 in. across, the sides prominently furrowed, scarlet or yellow, smooth and bright. Probably African, but widely spread; sometimes grown for its ornamental frs.—*S. texanum*, Hort., appears to be a spineless race of this species.

14. *S. jasminoides*, Paxt. Climbing slender-stemmed glabrous spineless shrub grown under glass and in the open in mild climates, 10 ft. and more: lvs. 1–3 in. long, the upper ones simple and entire, lance-ovate to lanceolate, long-pointed,

many of the lower ones irregularly pinnatifid or pinnate with small side or basal segm.: fls. slender-pedicelled, in forking terminal and lateral clusters, about 1 in. across, white tinged blue, the corolla star-shaped and attractive. Brazil.

15. *S. Seaforthianum*, Andr. Slender climbing glabrous spineless shrub, 10 ft. and more: lvs. 4-8 in. long, all essentially odd-pinnate or those on flowering twigs sometimes simple, petiolate; pinnæ (or segms.) 2-4 pairs and often smaller ones between, narrow-ovate to lanceolate, acuminate, narrowed to base and often petiolulate, margins entire, often undulate: fls. many in small cymes, divaricately arranged on the sides of a rachis, 1 in. or less across, star-shaped, blue or purple: fr. ovoid to globose, scarlet. Probably Brazil; introduced into England from the W. Indies in 1804 by Lord Seaforth.

16. *S. Wendlandii*, Hook. f. Very strong large glabrous shrubby climber: lvs. 6-10 in. long, pinnatifid with 2-3 pairs of rather small segms., the terminal part large and mostly 3-lobed, usually the midrib, petiole and young sts. prickly; some of the upper lvs. simple and oval to oblong-acuminate: fls. lilac-blue, 2-2½ in. across, in large forking clusters: fr. globose. (Received at Kew from Dr. Wendland of the Botanic Garden in Hanover.) Costa Rica; a showy arbor and porch climber in S. Fla., S. Calif., and S.

2. **LYCOPERSICON**, Mill. TOMATO. About a dozen S. American soft herbs, perennial and perhaps annual, two of them grown for the edible fr.; sometimes united with *Solanum* but differing in being always unarmed, lvs. always pinnate or pinnatifid, and particularly in the anthers which are projected into sharp or narrow sterile tips and which dehisce from top to bottom: fls. yellow: fr. a pulpy berry; cells 2 or few, multiplying under domestication. (*Lycopersicon*: Greek *wolf peach*, probably in reference to supposed poisonous qualities.)

Plant hairy, with strong odor.....1. *L. esculentum*

Plant not hairy, very slender, with little or indifferent odor.....2. *L. pimpinellifolium*

1. *L. esculentum*, Mill. Spreading hairy-pubescent and more or less glandular strong-smelling plur-annual or perennial, 3-6 ft. or more, the young growth on mature plants erect: lvs. odd-pinnate with small lfts. interposed, 6-18 in. long; main lfts. 5-9, stalked, ovate to oblong, 2-3 in. long, acuminate, irregularly toothed, margins tending to roll inward: fls. 3-7, nodding, ¼ in. or more across, on jointed pedicels: fr. red or yellow, usually flattened at the ends, 2-3 in. across, the sides furrowed or angled. W. S. Amer.; now little known in cult. in this country.—Var. *cerasiforme*, Alef. CHERRY TOMATO. Lvs. thinner and mostly smaller and usually less acuminate: fls. prevailing in longer clusters: fr. globular and regular, about ¼ in. diam., red or yellow, few-celled; forms with oblong fr. are the Plum tomatoes. Var. *pyriforme*, Alef., PEAR TOMATO, differs in bearing pear-shaped frs., which are usually about 1½ in. long. Var. *commune*, Bailey (var. *vulgare*, Bailey, not Alef.). COMMON TOMATO. Lfts. little if at all conduplicate or curled, the plants heavier and more lopping: fr. mostly globular or only moderately oblate, not furrowed or lobed on the sides; parts of the fl. often multiplied, the cells becoming many. Cultigen. Var. *grandifolium*, Bailey. LARGE-LEAVED or POTATO-LEAVED TOMATO. Lvs. large and plane; lfts. usually not more than 5, large, with entire margins, the secondary lfts. few or none. Cultigen. Var. *validum*, Bailey. UPRIGHT TOMATO. Plant stout and erect, very compact, the lvs. crowded and curled. Cultigen; little grown in this country.

2. *L. pimpinellifolium*, Mill. (*L. racemiforme* and *L. racemigerum*, Lange). CURRANT TOMATO. Weak, slender-stemmed, not hairy but finely puberulent, the odor not pronounced: lfts. 5-7 with smaller ones interposed, long-stalked, ovate, ¾-1½ in. long, pointed or obtuse, base sometimes cordate: fls. 10-25 in an elongating two-sided raceme, the pedicels prominently geniculate: fr. red, currant-like, about ½ in. diam., 2-celled. Peru.

3. **CYPHOMANDRA**, Sendt. Thirty or more S. American herbs, shrubs, and small trees, technically separated from *Solanum* in the fact that the 2 anther-cells are separated by a thickened connective which appears as a column on the back of the anther: erect spineless plants, with large, entire, 3-lobed or pinnatisect lvs.: fls. pedicellate in racemes or scorpioid cymes, calyx and rotate or bell-shaped corolla 5-lobed; anthers opening at apex or on side:

fr. a 2-celled many-seeded berry, sometimes large, in one species prized as a cult. esculent. (Cyphomandra: Greek, referring to the peculiar anthers.)

**C. betacea**, Sendt. **TREE-TOMATO**. Tree-like somewhat woody shrub 6-10 ft., mostly pubescent or puberulent: lvs. simple and entire, cordate-ovate, 8-12 in. long, short-pointed, prominently pinnate-veined, soft-pubescent: fls. about  $\frac{1}{2}$  in. across, pinkish, fragrant, the corolla-lobes long and narrow: fr. egg-shaped or purplish, 2-3 in. long, smooth, long-peduncled, dull red, with a slightly acid tomato-like flavor. S. Amer., grown in the open in sub trop. parts and sometimes under glass in the N.

4. **ATROPA**, L. Two to four species of Old World herbs, one of economic importance as a source of atropine and other powerful drugs.—Glabrous and erect: lvs. entire: calyx bell-shaped, with 5 ovate leafy divisions, enlarging in fr.; corolla bell-shaped or funnelform: fr. a berry, subtended by enlarged calyx-lobes, poisonous. (At-ropa: after Atropos, the Fate who severs the thread of life.)

**A. Belladonna**, L. **BELLADONNA**. Branching leafy perennial, 2-3 ft., sparsely pubescent to glabrate: lvs. entire, ovate or oblong-ovate, 3-6 in. long, acuminate, narrowed to a petiole: fls. solitary or in pairs, nodding, on axillary pedicels; corolla blue-purple, or dull red, about 1 in. long: berry nearly globular, slightly 2-lobed, about  $\frac{1}{2}$  in. across, seedful, shining black. (Belladonna: Italian *beautiful woman*, the red sap used as a cosmetic in Italy.) Eu. and Asia.

5. **PHYSALIS**, L. **HUSK-TOMATO**. **GROUND-CHERRY**. Low herbs of warm and temp. countries, largely America, a few grown for the edible frs. and also for the ornamental fruiting calyx of some species; probably 75 or more species.—Annual and perennial summer-flowering herbs or sometimes slightly woody at base, straggling, diffuse or creeping, glabrous or pubescent: lvs. alternate, often 2 together, simple, mostly angled and distinctly petioled, commonly soft in texture: fls. usually on axillary or extra-axillary pedicels, mostly blue or yellowish or whitish and not showy; calyx 5-toothed or -cleft, becoming large and bladder-like and inclosing the 2-celled globular yellow or greenish often more or less viscid berry; corolla rotate or short-campanulate, usually with purplish spots in the center, plicate, short-tubed and mostly 5-toothed; stamens 5; style slender, the stigma somewhat 2-lobed. (Physalis: Greek *bladder*, referring to the fruiting calyx.)

Plants with large red calices in fr. .... 1. *P. Alkekengi*  
Plants with green or yellow or at most only red-veined calices: mostly  
grown for the edible berry.

Sts. glabrous or very nearly so. .... 2. *P. ixocarpa*  
Sts. pubescent or hairy.

Anthers yellow: sts. prostrate or sometimes ascending to 1 ft. high. .... 3. *P. pubescens*  
Anthers blue-purple: sts. partially erect,  $1\frac{1}{2}$ -3 ft. high. .... 4. *P. peruviana*

1. **P. Alkekengi**, L. (*P. Francheti*, Hort. *P. Alkekengi* var. *Francheti*, Makino). **ALKEKENGI**. **WINTER-CHERRY**. **CHINESE LANTERN-PLANT**. Diffuse perennial but sometimes grown as an annual with long creeping underground sts., 1-2 ft. high, usually with zigzag mostly simple angled pubescent or glabrous sts.: lvs. ovate with broad base, 2-3 in. long, short-acuminate, often angular, ciliate, the petiole widening at top: fls. whitish, the anthers yellow: fr. red, the large ripened calyx blood-red, about 2 in. long, and very showy. (Alkekengi: Arabian name.) Apparently native from S. E. Eu. to Japan, but now adventive or naturalized in many parts of the world.—An old garden plant, grown for its highly colored bladders.

2. **P. ixocarpa**, Brot. (*P. edulis*, Hort.). **TOMATILLO**. Erect branching annual 3-4 ft. high, glabrous or very nearly so: lvs. thin, ovate to lance-ovate, 2-3 in. long, variously toothed or notched, long-petioled: fls. large and open,  $\frac{3}{4}$  in. or more across, the border bright yellow and the throat bearing 5 black-brown spots; anthers purplish: husk or enlarged calyx purple-veined, entirely filled by the large round purplish sticky berry, and sometimes torn by it. Mex., introduced northward; sometimes cult. for the fr.

3. **P. pubescens**, L. **STRAWBERRY-TOMATO**. **HUSK-TOMATO**. Low pubescent annual, with sts. prostrate and trailing or sometimes ascending to 1 ft. high: lvs.

rather thin, ovate, 2-4 in. long, mostly acuminate, oblique or semi-cordate at base, obtusely dentate or angled: fls.  $\frac{3}{8}$  in. or less long, bell-shaped, the limb or border erect and whitish-yellow, the throat marked with 5 brown spots inside; anthers yellow; calyx much shorter than corolla but enlarging in fr. and inclosing the globular yellow berry which is  $\frac{3}{4}$  in. diam., sweetish and not glutinous. N. Y. to the tropics. —Frs. eaten raw or cooked, or used for preserves or pickles; the species usually sold by seedsmen.

4. *P. peruviana*, L. (*P. edulis*, Sims). CAPE-GOOSEBERRY. Stronger grower than *P. pubescens*, standing partially erect and attaining a height of  $1\frac{1}{2}$ -3 ft., maturing later: lvs. thicker, soft-pubescent, broad, often not toothed, cordate at base: fls.  $\frac{1}{2}$  -  $\frac{3}{4}$  in. long, open-campanulate, the limb or border widely spreading and light yellow, the inside of the throat purple-blotched and veined; anthers blue-purple: husk thicker and larger, somewhat hairy, and longer-pointed; berry yellow, not glutinous, much like that of *P. pubescens* but usually less sweet. Tropics.

6. **IOCHROMA**, Benth. Shrubs and small trees, sometimes grown under glass and in the open in subtrop. parts; species about 20, mostly in W. trop. S. Amer.—Spineless, glabrous or stellate-tomentose: lvs. entire, often large: fls. purple, blue, scarlet, yellow or white, in pairs, or sometimes clustered; calyx tubular or campanulate, 5-toothed, enlarging in fr. and appressing or inclosing the berry; corolla long-tubular or narrow-trumpet-shaped, with 5 short or very small lobes, the throat more or less closed by appendages or folds; stamens inserted below the middle of the corolla-tube; disk present or absent; ovary 2-celled: fr. a pulpy globose or ovoid berry. (*Iocho-ma*: Greek *violet-colored*.)

Fls. blue: lvs. acute, long-petioled. . . . . 1. *I. lanceolatum*  
Fls. orange-scarlet (varying to white): lvs. very obtuse, short-petioled. . . . . 2. *I. fuchsoides*

1. *I. lanceolatum*, Miers. Shrub 4-8 ft. high, more or less downy: lvs. alternate, ovate or elliptic-lanceolate, acute, entire, tapering to a long petiole: umbels supra-axillary and terminal; fls. rich deep purple-blue; calyx abrupt at base, shallowly blunt-toothed, puberulent or glabrate; corolla pubescent, the tube slightly curved, the margin shortly and unequally 5-lobed or -toothed. Ecuador.—*I. tubulosum*, Benth., is to be looked for. It is a shrub 6-8 ft., with ovate ciliate lvs. and deep blue fls. on hairy pedicels; calyx subinflated, hairy, tapering, sharp-toothed. Colombia.

2. *I. fuchsoides*, Miers. Shrub, glabrous or nearly so: lvs. often clustered, obovate to oval or oblong, very obtuse, tapering to a short petiole: fls. more or less clustered, orange-scarlet (a white-fl. form is also offered), drooping; calyx broad or abrupt at base, shallowly blunt-toothed, puberulent; corolla thrice exceeding the 5-toothed bursting calyx, the tube long-cylindric and nearly straight, the limb 5-angled and with intermediate teeth. Peru.

7. **GRABOWSKIA**, Schlecht. About a half-dozen spiny shrubs of trop. and extra-trop. S. Amer., one sometimes planted in Calif. for ornamental purposes.—Lvs. oval, oblong or obovate, entire, sometimes fleshy: fls. small, violet, pale blue or whitish, borne singly at the nodes and in clusters on the ends of the branches; calyx 5-10-toothed, not enlarging in fr.; corolla funnel-form with short tube and 5-lobed spreading limb; stamens 5, exserted: fr. a berry with 2 pyrenes. (*Grabow-skia*: H. E. Grabowski, German apothecary and author "Flora von Ober-Schlesien," 1843.)

*G. boerhaaviæfolia*, Schlecht. (*G. glauca*, Hort.). Lycium-like bush, scrambling or wide-spreading, with gray-green foliage and axillary spines  $\frac{1}{4}$  in. long, and the shorter branches often sharp and spine-like: lvs. alternate, broad-oval to oblong, 1-1 $\frac{1}{2}$  in. long, obtuse or with very short point: fls. white or pale blue, inconspicuous, in clusters of 3-5, or solitary: berries  $\frac{1}{2}$  in. or less long. Peru.

8. **LYCIUM**, L. BOX-THORN. Woody plants, often climbing, grown for their fls. and for the attractive frs.; about 100 species in temp. and subtrop. parts of both hemispheres, often in dry regions.—Deciduous or evergreen shrubs, thorny or unarmed: lvs. alternate, often fascicled, short-petioled, small and commonly narrow, usually grayish-green, entire, without stipules:



fls. greenish, whitish, purplish, or violet, axillary, solitary or clustered, not large but often numerous on the long branches; calyx campanulate, 3-5-toothed, not enlarging in fr.; corolla funnelliform, with usually 5-lobed limb; stamens mostly 5, ours with a bearded ring near the base of the filament: fr. a berry with few to many seeds, usually scarlet. (Lyc-ium: Greek name from the country Lycia given to a Rhamnus, transferred later to this genus.)

—The two cult. species are known as Matrimony-Vine.

Corolla-tube longer than limb, much narrower below the middle: lvs.

usually lanceolate. ....1. *L. halimifolium*

Corolla-tube shorter than limb, rather wide: lvs. rhombic-ovate to

ovate-lanceolate .....2. *L. chinense*

1. *L. halimifolium*, Mill. Upright or spreading shrub with arching or recurving branches, usually spiny, to 10 ft. tall; branchlets light gray, angled: lvs. oblong-lanceolate to lanceolate or oblanceolate, rarely elliptic-lanceolate, 1-2½ in. long, acute or obtusish, gradually narrowed at base into a slender petiole to ¾ in. long, grayish-green, thickish: fls. 1-4, on slender pedicels ⅓-¾ in. long; calyx usually 1-3-lobed, divided about one-half, with obtusish lobes; corolla dull lilac-purple, the tube longer than the lobes and much narrowed below the middle; stamens hairy at base: fr. subglobose to ovoid or short-oblong, ½-¾ in. long, scarlet to orange-red. S. E. Eu. and W. Asia.

2. *L. chinense*, Mill. Rambling shrub with arching and often prostrate branches, usually unarmed, to 12 ft. long; branchlets light yellowish-gray, angled: lvs. rhombic-ovate or ovate to ovate-lanceolate, 1½-3½ in. long, acute or obtusish, broad- to narrow-cuneate at base, bright green and remaining green until late in autumn; petiole usually not exceeding ½ in.: fls. 1-4, on pedicels ⅓-½ in. rarely to ⅞ in. long; calyx 3-5-toothed, usually divided less than one-half, with acute lobes; corolla purple, the lobes slightly longer than the rather wide tube; stamens hairy at base: fr. ovoid to oblong, ⅔-1 in. long, scarlet to orange-red. E. Asia.

9. **MANDRAGORA**, L. **MANDRAKE**. Three or 4 species of practically stemless perennial herbs with thick or tuberous roots and undivided lvs., native in the Medit. country and the Himalayan region, interesting for medicinal qualities and also for connection with old superstitions; these are the true mandrakes, but in N. Amer. the name is applied to the may-apple (*Podophyllum peltatum*).—Lvs. all basal or semi-basal, broad, undulate: fls. rather large, solitary or fascicled among the foliage, whitish, blue-violet or purple, the 5-parted calyx somewhat enlarging in fr.; corolla bell-shaped, 5-lobed, bearing the 5 stamens on the tube below the middle; ovary 2-celled, with long style and expanded stigma: fr. a fleshy many-seeded globose berry. (Mandrag-ora: ancient name of doubtful application.)—Seldom cult., but seeds are available. Plants yield powerful extracts; the thick root sometimes has a human-like form of branching, giving rise to magic.

*M. officinarum*, L. A ft. or so high, with spindle-shaped often branching root: lvs. ovate, obtusish, undulate: fls. greenish-yellow, the corolla usually scarcely longer than the calyx. Medit. region and E.—*M. autumnalis*, Spreng., has violet fls., the corolla exceeding the calyx. Medit. countries.

10. **CAPSICUM**, L. **RED PEPPER**. Perennial woody plants but known in northern vegetable-gardens as herbaceous annuals, probably native in Cent. and S. Amer., and one anomalous species in Japan; American species 1 or many, depending on the definition.—Erect much-branching essentially glabrous plants: lvs. ovate, elliptic to narrow-lanceolate, simple and entire: fls. white or greenish-white sometimes tinged violet, pedicelled, solitary or in 2's or 3's, erect or declined; calyx short, nearly truncate but usually with very short points, somewhat enlarging about the base of the fr.; corolla rotate or nearly so, usually 5-lobed; stamens commonly 5, not closely connivent, mostly bluish, anthers opening longitudinally; ovary 2-3-celled, but the cells often multiplying under domestication, style simple, stigma capitate: fr. a pod-like

indehiscent many-seeded berry with thick integument, widely various in size, shape and color, pungent to the taste. (Cap-sicum: name not satisfactorily explained.)

**C. frutescens**, L. (*C. annuum* and *C. baccatum*, L.). Shrub to 6-8 ft., trunk becoming 3 in. through, the wood very hard, but plants capable of fruiting the first year from seed and, in the N., not developing woody tissue before frost: lvs. various, often less than 1 in. long, in cult. forms sometimes 5 in. long, narrowed to petiole, usually acuminate: fls.  $\frac{3}{8}$ - $\frac{5}{8}$  in. across, in developed and monstrous forms sometimes larger: fr. various in the wild or spontaneous shrubby trop. forms, strangely diverse in the cult. kinds, sometimes remaining erect, sometimes declined or drooping.—The capsicums may be variously and almost endlessly ranged into vars. The most practical classification is on the frs., as to position, size and shape. The biological type of *C. frutescens* may well be considered to be the little **BIRD PEPPER**, with undeveloped frs. (*C. microcarpum*, DC.): twiggy shrub with short internodes: lvs. ovate, 1-2 in. long: fr. erect, spherical or oblong,  $\frac{3}{4}$  in. or less long and  $\frac{1}{4}$  in. or less broad, mostly red: a prevailing wild or spontaneous form in warm countries. The races with developed frs. may be conveniently ranged in about four main groups: Var. **cerasiforme**, Bailey. **CHERRY PEPPERS**. Lvs. of intermediate size, ovate or oblong, 2-3 in. long: fr. erect or declined, spherical, subcordate or oblate,  $\frac{1}{2}$ -1 in. diam., red, yellow, or purplish, very pungent. Var. **conoides**, Bailey. **CONE PEPPERS**. Like the last, but frs. conical or oblong-cylindrical, 1-2 in. long, usually erect. Var. **fasciculatum**, Bailey. **RED CLUSTER PEPPER**. Plant compact, with narrow clustered lvs.: fr. erect, fascicled, very slender, 3 in. long and  $\frac{1}{4}$  in. thick, red, very pungent. Var. **longum**, Bailey. **LONG PEPPERS**. Lvs. medium to large: fr. mostly drooping, elongated, 3-12 in. long and mostly tapering to apex, often curved, sometimes 2 in. thick at base; includes Long Red, Long Yellow, Chilli, Cayenne, and others. Var. **grossum**, Bailey. **BELL or SWEET PEPPERS**. Plant stout and tall: lvs. oblong-ovate, 4-5 in. long: fls. 1 in. or more across: fr. large and puffy with depression at base, the sides usually furrowed, either oblong, bell-shaped or apple-shaped and tomato-like, red or yellow, mild in flavor.

**11. CESTRUM**, L. Shrubs and small trees of the American tropics, some of them planted in warm countries and grown under glass for the attractive and often very fragrant fls.; species about 150.—Lvs. simple and entire, mostly narrow rather than broad: fls. in axillary or terminal clusters, tubular, not large but numerous or bright-colored, greenish, white, yellow, or red, the limb salver-like or trumpet-like, the long tube either enlarged or contracted at the throat, the 5-toothed calyx relatively short; stamens attached in the tube, included; ovary 2-celled, with 3-6 ovules in each cell, usually on a short stipe; style slender, stigma expanded and sometimes 2-lobed: fr. a small berry, often scarcely succulent. (Ces-trum: old Greek name of some plant.)

Fls. conspicuously contracted at mouth; corolla red or rose. (**HABRO-THAMNUS**.)

Inf. rather loose or elongated.....1. *C. elegans*

Inf. globular-compact, commonly closely subtended by lvs.....2. *C. fasciculatum*

Fls. not contracted at throat, but usually expanded. (**CESTRUM** proper, sometimes known as **Jessamines**.)

Lobes of corolla blunt, becoming distinctly reflexed.

Corolla orange-yellow.....3. *C. aurantiacum*

Corolla white.....4. *C. divinum*

Lobes acute, erect or spreading.

Lvs. oblong-ovate or elliptic, short-acuminate.....5. *C. nocturnum*

Lvs. on the lanceolate order, very long-tapering.....6. *C. Parqui*

**1. C. elegans**, Schlecht. Tall and slender bush, with flexuose hairy-pubescent branches with a somewhat scandent habit: lvs. narrow-ovate to ovate-lanceolate,  $2\frac{1}{2}$ -4 in. long and 1- $1\frac{1}{2}$  in. broad, gradually acuminate, short-petioled, pubescent beneath and light-pubescent to glabrate above: fls. in rather loose terminal clusters that are more or less nodding; corolla  $\frac{3}{4}$ -1 in. long, red-purple, upwardly swollen but constricted at the throat, very slender at the base, several times longer than the calyx, the acute lobes becoming reflexed: berries globular, about  $\frac{1}{2}$  in. across, red. Mex.; an old greenhouse plant, of continuous bloom.—Var. **Smithii**, Bailey (*C. Smithii*, Hort.), has blush-rose fls. There is also a kind with variegated lvs.

**2. C. fasciculatum**, Miers. Fls. purplish-red, larger than those of No. 1, mostly in spring, in compact globular clusters that are usually attended by small lvs. like

an involucre: lvs. ovate, 2-2½ in. broad. Mex.—Var. **Newelli**, Bailey (*C. Newelli*, Nichols.), has large bright crimson fls., and is a free-bloomer.

3. **C. aurantiacum**, Lindl. Half-climbing nearly or quite glabrous shrub: lvs. ovate or oval, 3-4 in. long and 1¾-2½ in. broad, short-pointed and not very acute, often somewhat undulate: fls. 2-5 together, sessile, combined in a terminal panicle; corolla orange-yellow, ¾-1 in. long, the large acutish lobes strongly reflexed. Guatemala.

4. **C. diurnum**, L. DAY-JESSAMINE. Large shrub with wiry and puberulent growth: lvs. thick, persistent, oblong or elliptic, 2-3½ in. long, about 1 in. broad, obtuse or only indifferently acute, glabrous and glossy above, lighter colored and puberulent on veins beneath or becoming glabrate: fls. white, sweet-scented by day, sessile in short clusters on long axillary peduncles; corolla ½-½ in. long, the short bluntish lobes reflexed at full anthesis. W. Indies; frequently planted far S., and sometimes passing as *C. laurifolium*.

5. **C. nocturnum**, L. NIGHT-JESSAMINE. Shrub to 12 ft., with glabrous angled branchlets: lvs. thin, mostly oblong-ovate to elliptic and rather short-acuminate, 4-8 in. long, mostly about 1½ in. broad, glabrous and more or less shining both sides, usually broad-based, petiole distinct: fls. greenish-white to cream-colored, very fragrant at night, nearly or quite sessile on axillary elongating but not long-peduncled clusters; corolla very slender, about ¾ in. long, the acute lobes erect or only spreading. W. Indies; commonly planted far S.

6. **C. Parqui**, L'Her. WILLOW-LEAVED-JESSAMINE. Nearly glabrous shrub, distinguished by short-petioled narrow lvs. that are lanceolate and long-tapering at apex and base, 3-6 in. long, usually not much exceeding 1 in. broad: fls. greenish-white to greenish-yellow, fragrant at night, sessile in profuse axillary and terminal clusters; corolla ¾-1 in. long, the acute lobes wide-spreading and the edges sometimes revolute. (Parqui is the name of the plant in Chile, once proposed as a generic name.) W. S. Amer.; in certain broad-leaved forms difficult to separate from No. 5.

12. **SALPICHROA**, Miers. About a dozen shrubs, subshrubs, or herbs of extra-trop. S. Amer. and 1 in Ariz., one of them sometimes used for cover-planting in S. Calif.—Lvs. entire, often hairy, narrowing to a long petiole: fls. white or yellow, solitary; calyx tubular, 5-cleft, in fr. hardly enlarged; corolla tubular or urn-shaped, with or without a woolly ring inside; stamens inserted at about the middle of the corolla-tube or even higher: berry ovoid or oblong, red, 2-celled, with numerous compressed seeds. (*Salpichroa*: Greek *tube* or *trumpet*, and *skin* or *complexion*, in reference to the form and texture of the fl.)

**S. rhomboidea**, Miers. A weedy climber, perennial from a fleshy root, somewhat woody, with green flexuous branches and strong odor: lvs. subopposite, ovate-rhomboid, ½-¾ in. long, narrowed to a petiole: fls. white, solitary or rarely in pairs, nodding, on filiform pedicels scarcely shorter than the petioles; corolla short, urceolate, constricted below the middle and at the throat, about ½ in. long, the inside of the tube with a woolly ring: berry ovate-oblong, yellow or white, many-seeded, said to be edible but of poor flavor. Argentina; thrives in dry and alkaline places; mentioned as a forage plant for bees.

13. **SOLANDRA**, Sw. About a half-dozen tall glabrous woody plants with branches climbing, bearing very showy fls., suitable for the warmhouse and grown in the open in the warmest parts of the U. S.—Lvs. entire, leathery, shining: fls. solitary, very large, white or yellow; calyx long-tubular, sleeve-like, 2-3-toothed at the apex; corolla funnelform, with long cylindric tube and oblique broad-campanulate throat, the limb with broad lobes; stamens 5, inserted near the base of the corolla; ovary 2-celled, with many ovules: berry globose or elongated, pulpy, more or less included in the calyx, with large smooth seeds. (*Solan-dra*: named for Daniel C. Solander, 1736-1786, Swedish naturalist and traveler.)

**S. guttata**, Don. Strong branching climbing shrub: lvs. elliptic-oblong, acute or very short-acuminate or sometimes blunt at apex, 2-6 in. long: fls. terminal, solitary, fragrant; calyx tubular, about 3 in. long, with 3-lobed limb; corolla ochre-yellow,

funneliform, 9 in. long, the slender part much exceeding calyx, the limb with 5 crenate and undulate lobes, the throat with 5 purple-brown ridges; stamens subequal, scarcely protruding beyond the throat; pistil prominent. Mex., sometimes grown as *S. grandiflora*, Sw., in which, however, the slender part of the tube is not longer than calyx.

14. **FABIANA**, Ruiz & Pav. A score or so of small heath-like shrubs, one sometimes grown for ornament in cool greenhouses and in mild climates; Bolivia and Brazil to Patagonia.—Erect branching plants, sometimes viscid: lvs. small and crowded: fls. small, white, usually many, terminal or opposite the lvs.; calyx tubular-campanulate, shortly 5-toothed; corolla-tube elongate, dilated or ventricose above, the short limb 5-lobed or scarcely lobed; stamens 5, unequal, inserted at or below the middle of the corolla-tube, included; disk fleshy, annular or lobed; ovary 2-celled: caps. oblong, 2-valved. (*Fabiana*: after Francisco Fabiano, Spanish Archbishop and amateur botanist.)

**F. imbricata**, Ruiz & Pav. Height 3–8 ft.: branchlets many, erect, puberulous: lvs. numerous, ovate, scale-like, imbricated: fls. sessile or nearly so, borne singly but profusely on the ends of short branchlets; corolla about  $\frac{1}{2}$  in. long, much constricted at the base, the lobes short, rounded and reflexed. Peru.

15. **HYOSCYAMUS**, L. **HENBANE**. Erect or prostrate coarse herbs of the Medit. region; about 15 species, one naturalized in Amer. and sometimes grown for medicinal uses.—Plant usually hairy, annual, biennial, perennial: lvs. alternate, coarsely toothed or pinnatifid, rarely entire: fls. axillary, the uppermost forming a leafy cluster or spike; calyx 5-toothed, enlarging in fr.; corolla pallid or lurid and reticulate, funnel-shaped, 5-lobed and sometimes unequally so, often splitting down one side; stamens usually exserted; disk inconspicuous or lacking: caps. more or less 2-celled, circumscissile or sometimes opening by valves. (*Hyoscyamus*: Greek *hog bean*, supposed to poison swine.)

**H. niger**, L. Annual or usually biennial, 1–2½ ft. high, with fusiform root: lvs. oblong, 3–8 in. long, irregularly sinuate-toothed or pinnatifid, the lower petiolate, the others more or less clasping and decurrent: fls. subsessile, erect, in simple one-sided terminal spikes; corolla greenish-yellow, purple-veined: caps. inclosed in the enlarging calyx: lvs. and flowering tops medicinal.

16. **NICOTIANA**, L. Some 50 species and many subspecies of herbaceous or rarely shrubby or arborescent plants, certain of them valued for their stately habit, rapid growth, and large lvs., others for showy fls.; one is the tobacco; native mostly in N., Cent., and S. Amer., especially in the western trop. part, a few species in the Pacific Isls. and 1 in Australia.—Annuals or perennials, often viscid-pubescent, strongly scented, possessing narcotic-poisonous properties: lvs. alternate, simple, entire or rarely sinuate, mostly sessile or nearly so by a tapering base: fls. white, yellow, greenish, or purple, usually opening at night and then most fragrant, arranged in a terminal panicle or in elongate one-sided racemes, or the lower solitary in the axils; calyx tubular-campanulate, 5-lobed; corolla with long tube and 5-lobed often oblique limb; stamens 5, included or exserted: caps. 2- or seldom 4-valved, the valves 2-toothed or -cleft; seeds numerous, minute. (*Nicotia*-na: named for Jean Nicot, 1530–1600, French consul to Portugal, who is said to have first presented tobacco to the courts of Portugal and France.)

Lobes of corolla obtuse or rounded, often emarginate.

Shape of corolla salverform, the lobes equal or nearly so.

St. reaching 10–20 ft.: fls. inclined; corolla-lobes obtuse.....1. *N. tomentosa*

St. 2–3 ft. high: fls. horizontal or ascending.

Corolla-lobes emarginate, white.....2. *N. noctiflora*

Corolla-lobes usually entire, colored.....5. *N. Sandera*

Shape of corolla somewhat 2-lipped: st. 1–2 ft. high: fls. nodding.....3. *N. suaveolens*

Lobes of corolla acute or acuminate even though sometimes emarginate.



- Color of corolla rose or red (rarely white).  
 Corolla funnelform, red or rarely white.....4. *N. Tabacum*  
 Corolla salverform, rose-colored.....5. *N. Sanderæ*  
 Color of corolla white or greenish or purplish.  
 Corolla four to five times longer than calyx.....6. *N. alata*  
 Corolla six to seven times longer than calyx.  
 Calyx-lobes linear-lanceolate; corolla greenish or yellowish or  
 pale violet without.....7. *N. longiflora*  
 Calyx-teeth ovate; corolla entirely white.....8. *N. sylvestris*

1. *N. tomentosa*, Ruiz & Pav. (*N. colossea*, André). Herbaceous or woody perennial often cult. as an annual, viscid-pubescent, reaching 10-20 ft., branched from base: lvs. obovate-oblong, 10-18 in. or more, long, acuminate, narrowing to a broad undulate winged petiole with clasping base, pale green with conspicuous midrib and veins: panicle terminal, nearly 1 ft. long and as broad, the branches ascending, loose-fld.; fls. inclined,  $1\frac{1}{2}$  in. long, on pedicels  $\frac{1}{2}$ - $\frac{2}{3}$  in. long; calyx  $\frac{1}{2}$  in. long, the obtuse lobes shorter than tube; corolla salverform, slightly incurved, with tube somewhat exceeding the calyx-lobes, pale green without, the ovate obtuse spreading lobes yellowish tinged with red within; stamens twice as long as corolla-lobes; style reddish, longer than the stamens, stigma 2-lobed. Brazil.—A var. has mottled and margined lvs.

2. *N. noctiflora*, Hook. Perennial, with appressed glandular hairs, branching and erect, 2-3 ft.: lvs. petiolate, undulate-crested, the lower oblong, obtuse, the upper nearly sessile, linear-lanceolate, acute: fls. horizontal, pedicelled, in terminal panicles; calyx tubular, with 5 unequal, narrow, lanceolate, acute teeth; corolla salverform, opening at night, fragrant, white, purplish without (a var. with fls. white or greenish-white outside), about three times as long as the calyx, the tube cylindric, the limb with equal obcordate emarginate lobes: caps. longer than calyx. Argentina and Chile.

3. *N. suaveolens*, Lehm. Annual or biennial, usually viscid, 1-2 ft., the sub-simple st. villous below, glabrous above: basal lvs. subpetiolate, spatulate, obtuse, the cauline ovate-lanceolate, undulate, acute, decurrent on the petiole, the uppermost subsessile: fls. nodding, distant, in terminal bracteate racemes; calyx deeply 5-cleft, pubescent, with narrow unequal acute lobes; corolla greenish-purple, opening at night, fragrant, the limb somewhat 2-lipped with upper lobes very small, all subrotund, obtuse or emarginate: caps. ovate, obtuse, included. Australia.

4. *N. Tabacum*, L. TOBACCO. Annual and herbaceous or sometimes of longer duration and somewhat shrubby at base, viscid-pubescent, erect, branching above: lvs. large, often 1 ft. or more long, oblong-lanceolate, acuminate, sessile, the lower decurrent and half-clasping: fls. diurnal,  $1\frac{1}{2}$ -2 in. long, pedicelled, bracteate, in short many-fld. paniced racemes; calyx oblong, with lanceolate acute unequal segms.: corolla woolly without, funnelform, the throat somewhat swollen, the rose-colored or red limb with acute lobes: caps. ovoid,  $\frac{3}{4}$  in. long, about equaling the calyx. (*Tabacum*: Latinization of an aboriginal American name from which comes also the word *tobacco*.) Trop. Amer.—Cult. by the Indians from earliest times and often running wild. A striking garden plant and also important commercially as the source of tobacco; there are many cultivars.

5. *N. Sanderæ*, Sander (*N. alata*  $\times$  *N. Forgetiana*). The red-fld. garden nicotiana: viscid-pubescent annual herb 2-3 ft. high, of bushy habit: basal lvs. 6-12 in. long, spatulate, undulate; st.-lvs. oblong-lanceolate, short-petioled, acuminate, undulate: fls. bracteolate, in large loose panicles; corolla salverform, the cylindric tube three times as long as the calyx, swollen above, greenish-yellow tinted with rose, the limb oblique, with carmine-rose lobes elliptic, acute, obtuse or often emarginate. Originated in 1903 by Sander & Sons, St. Albans, England.—*N. Forgetiana*, Sander, is an annual rose-fld. species from Brazil with oblong-lanceolate obtuse wing-petioled lvs. about 1 ft. long, and narrow corolla 1-1 $\frac{1}{4}$  in. long, with broad mostly obtuse lobes; probably not in cult. here. Procured in Brazil for Messrs. Sander by their collector, Mr. Forget.

6. *N. alata*, Link & Otto. Perennial, 3-5 ft., glandular-hairy, with erect branching st.: lvs. lanceolate or oblong, 3-4 in. or more long, decurrent in narrow wings, more or less repand-dentate or undulate, acute or obtuse, the upper narrower: fls. in a loose terminal raceme; calyx hirsute, tubular, the 5 lobes subulate and nearly equal; corolla villous, fragrant, opening at night, and closing in cloudy weather, the slender tube yellowish-green, swollen above, four to five times longer than the calyx, the limb oblique, nearly 2 in. across, pale violet beneath, white within, with ovate acute or often emarginate lobes; stamens unequal, not exserted: caps. oblong, shorter than the calyx. Brazil, Uruguay, Paraguay.—Perhaps not in cult., the

garden form being var. *grandiflora*, Comes (*N. affinis*, T. Moore), with very large fragrant fls., the corolla-tube much dilated, the limb yellowish without; known only in cult.

7. *N. longiflora*, Cav. Slender erect annual or perennial, 2-3 ft., scabrous and glandular-hairy: basal lvs. ovate-lanceolate, 9 in. long, acute, undulate, narrowed to a short petiole; cauline lvs. 3 in. long, sessile, narrower: fls. pedicelled, 4-6 in. long, solitary and opposite the lvs., or in simple elongate terminal racemes; calyx tubular-campanulate, 5-angled and 5-cleft, the lobes linear-lanceolate, obtusish and erect; corolla salverform, night-opening, fragrant, the tube slender, swollen above, green or pale violet, the limb with ovate-lanceolate obtuse or emarginate nearly equal lobes  $\frac{1}{2}$  in. long, yellowish-violet without, white within: caps. nearly equaling the calyx. Tex. to Chile and Argentina.—Rare in cult., sparingly escaped.

8. *N. sylvestris*, Spegaz. & Comes. Tall perennial, glandular-hairy throughout, the st. leafy below, branching above: lvs. rugose, sessile, broadly oblong-spatulate, the lower dilated at base, half-clasping and auricled, somewhat decurrent, rotund or obtuse at apex, the upper acute: fls. in short head-like panicles, drooping, on pedicels nearly equaling the calyx, not closing in the morning on cloudy days; calyx 5-angled, somewhat swollen, with short, unequal, ovate, acute teeth; corolla entirely white, fragrant, salverform, the tube about  $3\frac{1}{2}$  in. long, above somewhat inflated, the ovate-triangular often emarginate lobes nearly equal, becoming reflexed. Argentina.

17. **DATURA**, L. Large coarse erect plants, several cult. for their great trumpet-like odorous fls.; a dozen to 15 species, mostly with strong-smelling herbage, in the warmer parts of the globe, but some of them wide-spread weeds.—Forking bushy annuals, shrubs, or trees, with narcotic principles: lvs. large, simple, entire or coarsely sinuate-dentate: fls. large, axillary and solitary, erect or pendulous, white, red, violet, or yellow; calyx long-tubular, 5-toothed or spathe-like, splitting lengthwise or circumscissile with the base left as a cup on the fr.; corolla trumpet-shaped with spreading plicate limb shortly and broadly lobed, the lobes often acuminate; stamens inserted near the base of the corolla-tube, included or only slightly exserted; style long-filiform, 2-lobed: fr. a large 2-celled (falsely 4-celled) caps. mostly prickly or spiny, usually dry and 4-valved at top but sometimes fleshy and bursting irregularly or indehiscent; seeds large. (Datu-ra: vernacular E. Indian name.)—**D. Stramonium**, L., is a common white-fl'd. prickly-fruited big weed, with a purple-fl'd. variant (*D. Tatula*, L.), and sometimes with spineless pods (*D. inermis*, Jacq.); it is Jimson Weed (Jamestown weed).

Fls. erect; calyx circumscissile, the upper part falling off.

Plant glabrous.....1. *D. Metel*

Plant puberulent and somewhat glaucous.....2. *D. meteloides*

Fls. pendulous; calyx not circumscissile. (BRUGMANSIA. Angels Trumpet.)

Calyx toothed at the apex.

Corolla red: anthers separate.....3. *D. sanguinea*

Corolla white: anthers connate.....4. *D. suaveolens*

Calyx spathe-like, running to a single point.....5. *D. arborea*

1. **D. Metel**, L. (*D. fastuosa*, L.). Annual glabrous herb 4-5 ft. high: lvs. ovate-lanceolate, acuminate or acute, unequal at base, sinuate-toothed or repand, glabrous on both sides, solitary or the upper in pairs with one larger than the other, the larger 7-8 in. long: fls. erect,  $6\frac{1}{2}$ -7 in. long; calyx purple, tubular-angulate, 2 in. long, 5-toothed, the teeth triangular-lanceolate, acuminate; corolla white, often violet outside, to yellowish, the limb typically with 5 but sometimes with 6 long-cuspidate acute angles, in cult. often double, the inner corollas 5-10-lobed; stamens 5-6: caps. subglobose, short-spiny,  $1\frac{1}{4}$  in. diam., indehiscent. (Metel is an Arabic or E. Indian vernacular name.) India; naturalized in the tropics of both hemispheres.—The most frequent garden datura, resembling the common *D. Stramonium*, but with larger fls. The color is variable; the plant known as *D. chlorantha*, Hook., has greenish-yellow fls.

2. **D. meteloides**, Dunal (*D. Wrightii*, Hort.). Handsome herbaceous perennial, 1-3 ft., cult. as an annual, glaucescent and puberulent, grayish, the slender branches forked: lvs. unequally ovate, repand or subentire, acuminate, the upper often in unequal pairs, the larger 2- $2\frac{1}{4}$  in. long: fls. erect; calyx tubular, 3 in. long, with long acute unequal teeth; corolla white tinged with rose or violet, sweet-scented,

about twice as long as calyx, with 5 or 10 slender-subulate teeth: caps. subglobose, 2 in. diam., with long sharp spines, bursting irregularly; seeds narrowly margined. Tex. to Calif. and N. Mex.; used medicinally and ceremonially by certain Indian tribes.

3. *D. sanguinea*, Ruiz & Pav. Tree-like shrub 4-12 ft. high; branches fragile, leafy at apex: lvs. clustered, 5-7 from the same point, narrow-oblong, acute or acuminate, 7 in. long, pubescent on both sides, shining green above, paler beneath, the lower sinuate-angled, the upper entire; petioles  $2\frac{1}{2}$  in. long, channeled, pubescent: fls. 8-10 in. long, terminal, peduncled, pendulous, brilliant orange-red with yellow nerves, inodorous; calyx ovate, 5-angled, variegated, one-third as long as corolla; anthers separate: caps. turbinate,  $3\frac{1}{2}$  in. long, unarmed, at maturity yellow; seeds with narcotic properties. Peru.

4. *D. suaveolens*, Humb. & Bonpl. (*D. Gardneri*, Hook.). Tree-like shrub 10-15 ft. high: lvs. ovate-oblong, petioled, often unequal at base, entire, acute, glabrous, 6-12 in. long: fls. white, 9-12 in. long, nodding, on pedicels  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long; calyx inflated, angled, obscurely 5-toothed; corolla-tube plicate, the limb with 5 short segms.; anthers connate about the style: caps. unarmed, spindle-shaped, about 5 in. long, destitute of calyx. Brazil.—Usually cult. as *D. arborea*.

5. *D. arborea*, L. Small tree: lvs. ovate-lanceolate, oblong or ovate, entire or nearly so, pubescent, in pairs, one a third shorter than the other; petioles 1 in. or more long: fls. with a musk-like odor, nodding, on solitary axillary pedicels; calyx tubular, spathe-like, entire; corolla 6-9 in. long, white with greenish nerves, the limb with very long acuminate lobes; anthers distinct: caps. broad-ovoid,  $2\frac{1}{2}$  in. long, unarmed. Peruvian Andes.

18. **NIEREMBERGIA**, Ruiz & Pav. CUP-FLOWER. Subshrubs and low perennial herbs with showy white or pale fls., grown in the open border and as pot-plants, ordinarily treated as annuals; about 25 species from trop. and sub-trop. Amer., allied to *Petunia* and characterized by the long and very slender corolla-tube.—Decumbent or creeping, sometimes erect, mostly glabrous, diffusely branched, the branches slender: lvs. alternate, scattered, simple and entire: fls. white or pale violet, often with purple center, borne singly at or near the tips of the branchlets; calyx tubular or campanulate, 5-parted; corolla with slender elongate tube abruptly expanded above, the limb with 5 broad lobes; stamens inserted on the upper part of the corolla-tube, more or less exerted, 4 of them paired, the fifth smaller: caps. 2-valved, the valves mostly 2-cleft. (Nierembergia: for John Eusebius Nieremberg, about 1595-1658, a Spanish Jesuit and first professor of natural history at Madrid.)

Lvs. oblong or spatulate.....1. *N. rivularis*

Lvs. very narrow, linear.....

Plant low, prostrate or creeping.....2. *N. gracilis*

Plant mostly above 1 ft., erect or nearly so.....3. *N. frutescens*

1. *N. rivularis*, Miers. WHITE-CUP. Glabrous throughout, the slender creeping sts. rooting freely at the nodes and forming a dense mat, the branches seldom rising over 6 in. high: lvs. membranaceous, oblong to oblong-spatulate, with long slender petiole: fls. sessile or short-peduncled, creamy-white sometimes tinged rose or blue; calyx cylindric, the lobes oblong-lanceolate, slightly spreading; corolla-limb broadly bell-shaped, 1-2 in. broad, with golden-yellow throat. Argentina region.

2. *N. gracilis*, Hook. (*N. filicaulis*, Hort. *N. calycina*, Hort., not Hook.). Branches very slender, ascending 6-8 in., slightly downy: lvs. scarcely  $\frac{1}{2}$  in. long, linear or only subspatulate, those on the younger branches somewhat hairy: corolla-limb spreading, convex, white tinged and veined with purple toward the center, the throat yellow. Argentina.—A garden var. has fls. lilac-tinted and more abundant.

3. *N. frutescens*, Dur. (*N. fruticosa*, Hort.). TALL CUP-FLOWER. Puberulent or nearly glabrous, 1-3 ft. high, shrubby, much branched: lvs. scattered, linear: fls. about 1 in. across, the saucer-shaped limb white tinted with lilac or blue, the throat yellow. Chile.—Valuable in the greenhouse or for the border, or as a pot-plant blooming almost continuously. There are vars. with white or purple fls., also with larger ones.

19. **PETUNIA**, Juss. Flower-garden annuals, or grown as such for their showy bloom; a dozen or more species, mostly natives of the southern part of S. Amer., some of them with small not attractive fls.—Branching viscid-pubescent annuals or perennials, of weak or straggling growth: lvs. soft, simple and entire, alternate or the upper opposite: fls. white or purple, or in shades of reddish, on solitary, terminal or axillary peduncles; calyx deeply 5-cleft, the lobes oblong or linear, obtuse; corolla funnellform or salverform, the long tube straight or nearly so and fitting loosely in the calyx, the limb broad and normally 5-lobed, equal or oblique or obscurely 2-lipped; stamens 5, inserted on or below the middle of the corolla-tube, 4 in pairs, the fifth much smaller or rudimentary: caps. 2-celled, the 2 valves undivided; seeds small, many. (Petu-nia: from a S. American aboriginal name.)

Fls. dull white, the tube long and narrow.....1. *P. axillaris*

Fls. usually colored, the tube short and broad.

Sts. very slender: fls. rose-red or violet, about 1 in. long.....2. *P. violacea*

Sts. stocky: fls. of various colors, larger.....3. *P. hybrida*

1. ***P. axillaris***, BSP. (*P. nyctaginiflora*, Juss.). LARGE WHITE PETUNIA. Tall and relatively stout, usually erect, 1–2 ft.: lvs. large and rather thick, oval-oblong, the upper sessile or nearly so, the lower narrowed into a distinct petiole: fls. dull white, 2–2½ in. long, fragrant at evening, the cylindric tube three to four times as long as calyx. Argentina.—Frequently seen in old gardens and also escaped.

2. ***P. violacea***, Lindl. VIOLET-FLOWERED PETUNIA. Glandular-hairy, viscid, the sts. 6–10 in. long, slender, branching, prostrate or the tips erect: lvs. ovate, shortly petioled, acute, the upper ovate-lanceolate, the floral in pairs: fls. 1–1½ in. long, rose-red or violet, the tube lighter; calyx deeply 5-parted into linear segms. about half or more as long as the funnel-shaped corolla-tube; corolla with subequal limb, the lobes ovate and acute; stamens 5, included, unequal. Argentina.—This species and its garden derivatives sometimes persist for a time as escapes.

3. ***P. hybrida***, Vilm. COMMON GARDEN PETUNIA. Cultigen; apparently a series of hybrids from the two preceding, remarkably variable but differing from either parent, although varying toward either one: fls. 2–3½ in. long, with funnel-shaped tube and mostly very broad limb; tube broader than in *P. axillaris*, longer with broader limb than in *P. violacea*; from both it differs in the much larger and multi-form fls. in various colors and more stocky growth. The various strains have fls. varying in size, form and color, sometimes measuring 4–5 in. across, often deeply fringed or full double, ranging from white to deep red-purple, variously striped and barred or with star-like markings radiating from the throat; the group comprises all the highly developed garden petunias.

20. **SALPIGLOSSIS**, Ruiz & Pav. A tall erect flower-garden annual and 7 or 8 other species, natives of Chile.—Annual, biennial or perennial, glandular-hairy, with st. erect: lvs. alternate, simple, entire, sinuate-dentate or pinnatifid: fls. few, mostly large, long-pedicelled; calyx tubular, 5-lobed; corolla funnellform with wide throat, the limb with 5 emarginate lobes; stamens 4, didynamous, included, the fifth wanting or represented by a staminode: caps. oblong or ovoid, the valves 2-cleft; seeds small. (Salpiglos-sis: Greek *tube* and *tonque*, alluding to the form of the corolla and the appearance of the style.)

***S. sinuata***, Ruiz & Pav. (*S. variabilis*, *S. hybrida*, and *S. grandiflora*, Hort.). Branching annual 1–2½ ft. high: lower lvs. petiolate, elliptic- or oblong-linear, sinuately toothed or pinnatifid; upper lvs. lanceolate or linear, entire or nearly so, subsessile, passing into the bracts of the infl.: fls. 2–2½ in. long and as wide, ranging from straw-color, primrose and yellow through scarlet nearly to blue, with great variation in venation and rich markings.—Several hort. vars. are offered, differing in color of fls.; perhaps other species have entered into some of these forms.

21. **BRUNSFELSIA**, L. (*Franciscea*, Pohl). Woody plants, a few grown for the showy or fragrant bloom in warm glasshouses and out-of-doors in the far S.; species above 20 in. Cent. and S. Amer. and W. Indies.—Shrubs or small trees, glabrous: lvs. alternate, simple and entire, often thick and glossy: fls. in loose or dense terminal cymes or solitary, mostly large or at least showy,



often fragrant, commonly blooming under glass in winter; calyx tubular or campanulate, 5-toothed or -cleft; corolla funnelform, the tube long, the limb with 5 broad obtuse lobes; stamens 4, inserted on the corolla-tube, included, didymous, all with anther-cells alike; ovary sessile, 2-celled, many-ovuled: fr. capsular or berry-like, with undivided valves. (*Brunfelsia*: Otto Brunfels or Brunfels, physician and first German botanist, died 1534.)

Corolla violet, purple, or blue, at least on tube, (or fading lighter), nearly or quite inodorous.

Calyx long-tubular, half or more the length of the corolla-tube..... 1. *B. calycina*

Calyx short, split nearly or quite to the base..... 2. *B. latifolia*

Corolla white or yellowish, very fragrant at night..... 3. *B. americana*

1. *B. calycina*, Benth. Erect or spreading, branching: lvs. short-petioled, ovate-oblong or elliptic, 3-4 in. long, acute, glabrous or nearly so, dark green above, pale green below: fls. rich dark purple, mostly inodorous, in few-fl. usually terminal cymes; calyx tubular, inflated, light green,  $\frac{3}{4}$ -1 in. long, rather bluntly short-lobed; corolla-limb 2 in. diam., the broadly 5-lobed limb with slightly wavy margins; stamens and style included. Brazil.—Variable in the size of the fls. and lvs. Var. *eximia*, Raffill. Free-flowering, slightly downy throughout, intermediate in size between the type and var. *macrantha*: branches mostly short and spur-like: lvs. elliptic, acutish or obtuse: fls. rich purple on first opening, soon fading to almost pure white, about  $1\frac{1}{2}$  in. diam., in 2-5-fl. clusters; calyx slender, slightly curved, hairy, about  $1\frac{1}{4}$  in. long. Brazil. Var. *floribunda*, Raffill (*B. floribunda*, Hort.). Dwarf floriferous free-branching shrub, glabrous throughout: lvs. 2-4 in. long, elliptic, rich dark green, prominently veined beneath: fls. rich violet with small white eye, produced rather early in the year, on stout pedicels  $\frac{1}{2}$  in. long; calyx  $\frac{5}{8}$  in. long, elliptic in outline; corolla-limb flat or nearly so. Var. *macrantha*, Raffill (*B. macrantha*, Lem. *B. grandiflora*, Don). Floriferous shrub for a warm greenhouse or subtrop. country, of strong vigorous growth, glabrous or nearly so: lvs. rich dark green, often 8 in. long and  $2\frac{1}{2}$  in. broad: cymes dense, terminal or in the axils of all the upper lvs.; calyx 1 in. long, bright green; corolla  $2\frac{1}{2}$ -3 in. diam., rich deep purple, with prominent lavender-blue ring surrounding the white eye at mouth of tube. Peru.

2. *B. latifolia*, Benth. Rather dwarf, with slender branches: lvs. elliptic, much as in No. 1: fls. nearly white to lavender and purple with lighter center, solitary or few in a cluster, the corolla-limb  $1\frac{1}{2}$  in. across and the lobes obtuse; calyx not inflated, about  $\frac{1}{2}$  in. long, cleft nearly or quite to the base, the lobes acute and reaching only one-third length of corolla-tube. Trop. Amer.

3. *B. americana*, L. LADY-OF-THE-NIGHT. Shrub 4-8 ft., twigs puberulent or glabrous: lvs. mostly elliptic to elliptic-ovate or -obovate,  $1\frac{1}{2}$ -4 in. long, entire, tapering to short petiole, apex acute, obtuse or even emarginate: fls. mostly solitary, terminal and axillary, very slender tube  $2\frac{1}{2}$ -4 in. long, limb  $1\frac{1}{2}$ -2 in. across, opening yellowish and becoming white, powerfully sweet-fragrant; calyx short and nearly truncate: fr. a yellowish berry  $\frac{3}{4}$  in. diam. W. Indies.

22. **BROWALLIA**, L. About a half-dozen mostly blue-fl. trop. American herbs, some cult. for the profuse bloom.—Annuals, glabrous or glandular: lvs. nearly or quite simple: fls. blue, violet, or sometimes white, solitary and axillary or in more or less one-sided racemes; calyx mostly 5-toothed; corolla with long straight slender 15-nerved tube and spreading 5-lobed more or less irregular limb; stamens 4, didymous, inserted above the middle of the corolla-tube, the anthers of the shorter pair with 1 cell undeveloped, fifth stamen sometimes represented by a rudiment: caps. with 2-lobed valves, included in calyx. (*Browallia*: after John Browall, Bishop of Abo, and botanist, Sweden, first part of 18th century.)

Corolla-segms. long, not notched, some of them acute or acuminate;

tube 1 in. long..... 1. *B. speciosa*

Corolla-segms. short, 2-lobed or -notched; tube  $\frac{3}{4}$  in. long or less.

Calyx hairy..... 2. *B. americana*

Calyx sticky or clammy..... 3. *B. viscosa*

1. *B. speciosa*, Hook. (*B. major*, Hort.). Glabrous or nearly so, half-shrubby, 2-5 ft. high: lvs. ovate, acute, opposite or alternate: fls. solitary, axillary, on

pedicels shorter than the lvs.; corolla-tube at least 1 in. long, two to three times as long as the calyx, abruptly swollen at the top beneath the limb; limb outspreading, of 5 ovate striate dark purple segms., pale lilac beneath,  $1\frac{1}{2}$ –2 in. across up and down. Colombia.—There are blue-, violet-, and white-fl. vars.

2. *B. americana*, L. (*B. demissa*, L. *B. elata*, L.). Branching, 1–2 ft. high: st. and lvs. pubescent or glabrous; lvs. ovate, rotund, cuneate or rarely cordate, petioled: fls. solitary and axillary below, racemose above; calyx hairy, the teeth unequal, acute and much shorter than the corolla-tube; corolla blue, violet, or, in some forms, white, the short segms. bifid. S. Amer.

3. *B. viscosa*, HBK. (*B. pulchella*, Hort.). Viscous and glandular-hairy, about 1 ft. high, stiffer in habit than *B. americana* and fls. more numerous: lvs. short-petioled, ovate, rough-hairy on both sides: lower fls. solitary in the axils, the upper racemose; pedicels a little shorter than the calyx; calyx-teeth very clammy, oblong, shorter than the corolla-tube; corolla dark blue with a white eye (varying to white), not over  $\frac{3}{4}$  in. long, the short segms. bifid. S. Amer.

23. **STREPTOSOLEN**, Miers. One evergreen shrub, native in Colombia and Ecuador, with large clusters of orange-red fls., suitable for greenhouse culture and for out-of-doors in mild climates.—Lvs. alternate, simple, entire, not large, rugose and veiny: fls. in a terminal corymbose panicle; calyx tubular-campanulate, shortly 5-cleft; corolla-tube elongated, somewhat twisted as shown by the spiral direction of the nerves at the base of the corolla, inside the calyx and upward, widening above, the spreading limb with 5 broad obtuse lobes; perfect stamens 4, didymous, the anthers of the shorter pair with 1 cell not developed; ovary stipitate, 2-celled: caps. somewhat leathery, the 2 valves 2-cleft. (*Streptosolen*: Greek *twisted* and *tube*, with reference to the form of the corolla-tube.)

*S. Jamesonii*, Miers. Scabrous-pubescent plant, 4–6 ft., with long flexuose branches on the ends of which the clusters of fls. are borne: lvs. petioled, oval,  $1\frac{1}{2}$  in. long or less, obtuse or acute: corolla  $1$ – $1\frac{1}{4}$  in. long, the limb darker colored. (Named for Dr. Wm. Jameson, who sent specimens of this plant to Kew.)

24. **SCHIZANTHUS**, Ruiz & Pav. BUTTERFLY-FLOWER. Annual or biennial herbs grown out-of-doors and also in pots for the profusion of showy bloom; about a score of species in Chile.—Erect, branching, more or less glandular-viscid: lvs. frequently pinnatisect or even pinnate, the segms. incised or dentate: fls. variously colored, in terminal cymes or panicles; calyx tubular, deeply 5-cleft, with narrow lobes; corolla with long or short tube and spreading almost bilabiate limb, the lobes deeply cut; stamens 4, 2 fertile and exserted, 2 sterile, a fifth represented by a small staminode; ovary oblong, 2-celled: caps. with 2-cleft valves; seeds numerous. (*Schizanthus*: Greek *cut flower*, from the incised corolla.)—One of the outlying genera in Solanaceæ, and except for the plicate æstivation and certain features of ovary might perhaps be included in Scrophulariaceæ.

Corolla-tube shorter than calyx.

Stamens prominently exserted from the throat.....1. *S. pinnatus*

Stamens little if at all projecting from the throat.....2. *S. wisetonensis*

Corolla-tube equaling or exceeding the calyx.

Middle segm. of anterior corolla-lip notched at apex.....3. *S. retusus*

Middle segm. not so notched.....4. *S. Grahami*

1. *S. pinnatus*, Ruiz & Pav. (*S. papilionaceus* and *S. grandiflorus*, Hort.). Thinly hairy and somewhat glandular,  $1\frac{1}{2}$ –4 ft. or more, slender-branching: lvs. 1–2-pinnatisect, the segms. entire, toothed or incisely pinnatifid: infl. elongate, of numerous fls. in paniced racemes; fls.  $\frac{3}{4}$ – $1\frac{1}{4}$  in. across, varying in depth of color and markings, the lower lip usually violet or lilac, the upper paler, its middle segm. with a yellow blotch toward base, spotted with purple or violet; corolla-tube shorter than calyx; stamens prominently showing at the throat.—The common and most variable species, with many hort. forms and vars. distinguished by height of st. and color-markings of the fls.; sometimes the fls. are bluish or lilac and without spots or streaks.

2. *S. wisetonensis*, Low. (*S. pinnatus* × *S. Grahami*). Mostly intermediate between the parents, the fls. resembling *S. Grahami* in outline, varying in color from white through bluish and pink to carmine-brown, the mid-lobe of the upper lip often suffused with yellow; corolla-tube seemingly shorter than calyx; stamens usually rather short-exserted; foliage and habit like *S. pinnatus*.

3. *S. retusus*, Hook. Branching but rather stocky, 2-2½ ft. high, the st. finely hairy or nearly glabrous: lvs. petioled, 5 in. or more long, unequally pinnatisect, the segms. incised or dentate: fls. solitary in the axils on long glandular-hairy pedicels or forming a large loose terminal panicle; calyx glandular-hairy; corolla 1-1¼ in. across, the tube as long as the calyx or longer, the large middle segm. of the upper lip orange except at the emarginate tip, the lateral segms. of the posterior lip falcate, acute, linear, longer than the middle segm.; stamens short-exserted.—There are several vars. differing in color, sometimes almost clear white.

4. *S. Grahami*, Gill. Glabrous, 1½-5 ft. high: lvs. 1-2-pinnatisect, the segms. entire or toothed-pinnatifid: fls. typically lilac or rose; corolla-tube as long as the calyx; middle segm. of anterior lip not notched at apex, its central portion yellow or orange; lateral segms. of posterior lip falcate, linear, acute, shorter than the middle segm.; stamens short-exserted. (Presumably named for Robt. Graham, 1786-1845, noted botanist of Scotland.)—There are vars. with white, flesh-colored, lilac, rose, or carmine fls.; apparently not common.

## 152. SCROPHULARIACÆÆ. FIGWORT FAMILY

Herbs, shrubs, or trees, of about 180 genera and perhaps 3,000 species widely distributed over the earth, many grown for ornament.—Lvs. alternate, opposite, or verticillate, exstipulate: fls. bisexual, usually irregular, the infl. various; calyx 4-5-toothed or divided, persistent; corolla gamopetalous, rotate or broadly campanulate or with cylindrical tube, the limb 4-5-lobed, equally spreading or bilabiate; stamens usually 4, didynamous, inserted on corolla-tube and alternate with its lobes, or sometimes 2 or 5 or the fifth stamen sterile or reduced to a gland; hypogynous disk present or obsolete; ovary superior, sessile, perfectly or imperfectly 2-celled, usually with many ovules in each cell, style entire or 2-lobed: fr. a caps. or rarely a berry.—Aside from the following, *Scrophularia nodosa*, L., is cult. for medicinal purposes. It is a coarse perennial to 3 ft. high, with opposite broadly ovate or cordate lvs. and small greenish-purple 5-lobed fls. in terminal panicle cymes; fifth sterile stamen reduced to a scale under upper lip of corolla. Eu., Asia. *Chænostoma hispidum*, Benth., is sometimes planted in S. Calif. It is a much-branched perennial or subshrub to 1½ ft. high, with small opposite toothed lvs. and white or rosy 5-lobed fls. about ¼ in. across in axillary or terminal racemes. S. Afr. *M-Q*, Fig. 12, page 570, show various structures in this family, although not all the species appear in this treatment.

- A. Number of stamens 2.
  - B. Corolla with spreading 4-5-lobed limb.
    - c. Tube of corolla very short..... 1. VERONICA
    - cc. Tube of corolla long and slender..... 19. ZALUZIANSKYA
  - BB. Corolla 2-lipped, the lower lip inflated and slipper-like..... 26. CALCEOLARIA
- AA. Number of stamens 5..... 6. VERBASCUM
- AAA. Number of stamens 4 (sometimes fifth sterile stamen present).
  - B. Habit climbing.
    - c. Throat with prominent palate closing it..... 8. ANTIRRHINUM
    - cc. Throat without palate..... 9. MAURANDIA
  - BB. Habit not climbing.
    - c. Sterile stamen evident.
      - d. Staminode as long as fertile stamens: seeds wingless..... 17. PENSTEMON
      - dd. Staminode shorter than fertile stamens: seeds winged..... 18. CHELONE
    - cc. Sterile stamen lacking or gland-like.
      - d. Calyx spathe-like..... 5. HEBENSTRETIA
      - dd. Calyx not spathe-like.
  - E. Lvs. all alternate.
    - F. Corolla-tube none..... 7. CELSIA
    - 'FF. Corolla with tube.
      - g. Throat closed by prominent palate: plant creeping.... 11. CYMBALARIA
      - gg. Throat not closed by palate: plant upright.

- H. Lobes of calyx extending half or two-thirds its length..... 2. REHMANNIA
- HH. Lobes of calyx extending nearly or quite to base.
  - I. Upper lip of corolla shorter than under lip..... 3. DIGITALIS
  - II. Upper lip of corolla as long as or longer than under lip..... 4. ISOPLEXIS
- EE. Lvs. opposite or verticillate or sometimes upper lvs. alternate.
  - F. Plant a tree, with large ovate pubescent lvs..... 13. PAULOWNIA
  - FF. Plant an herb or shrub.
    - G. Corolla-tube long.
      - H. Throat closed by prominent palate.
        - I. Corolla saccate or gibbous at base..... 8. ANTIRRHINUM
        - II. Corolla spurred at base.
          - J. Veining of lvs. pinnate: fls. in racemes or spikes..... 10. LINARIA
          - JJ. Veining of lvs. palmate: fls. solitary..... 11. CYMBALARIA
      - HH. Throat not closed by a palate.
        - I. Calyx 2-lipped or 2-parted..... 19. ZALUZIANSKYA
        - II. Calyx not tubular, deeply 5-parted or lobed at least to middle.
          - J. A shrub: corolla 5-lobed or only slightly 2-lipped.
            - K. Stamens exserted..... 14. PHYGELIUS
            - KK. Stamens included..... 15. RUSSELLIA
          - JJ. A prostrate herb: corolla strongly 2-lipped..... 20. MAZUS
      - III. Calyx tubular, not deeply parted.
        - J. Stamens all attached on corolla-tube: ribs of calyx not winged..... 21. MIMULUS
        - JJ. Stamens 2 on corolla-tube, 2 on throat: ribs of calyx winged..... 22. TORENIA
    - GG. Corolla-tube very short or none.
      - H. Tube of corolla none.
        - I. Under lip 2-spurred..... 23. DIASCIA
        - II. Under lip not 2-spurred.
          - J. Corolla turned upside down by torsion of pedicel..... 24. ALONSOA
          - JJ. Corolla not turned upside down..... 25. ANGELONIA
      - HH. Tube of corolla short.
        - I. Calyx parted to base: sterile stamen lacking..... 12. NEMESIA
        - II. Calyx not parted to base: sterile stamen gland-like..... 16. COLLINSIA

1. **VERONICA**, L. **SPEEDWELL**. About 200 species of herbs, shrubs, or rarely trees, distributed over temp. and cold regions, but rare in the tropics. —Lvs. opposite or rarely the cauline alternate or whorled, the floral lvs. always alternate: fls. in bracteate terminal or axillary racemes or spikes or sometimes solitary; calyx usually 4-parted, rarely 3- or 5-parted; corolla mostly with very short tube and spreading 4-5-lobed limb; stamens 2: caps. compressed or turgid, 2-grooved, septicidally or loculicidally dehiscent. (Veronica: named for St. Veronica.)—Aside from the following, *V. virginica*, L. (*Leptandra virginica*, Nutt.), native in E. N. Amer., may be planted: it is an erect herb to 6 ft. tall with lanceolate serrate whorled lvs. and white or pale blue fls. in dense erect terminal racemes. The cult. veronicas are often confused, and the botanical status of some of them is uncertain. Perhaps several of the species or races in the *V. Teucrium* group should be aggregated and bear the earlier name *V. latifolia*, L.

- A. Plant an herb.
  - B. Habit prostrate.
    - C. Lvs. glabrous: infl. terminal..... 1. *V. repens*
    - CC. Lvs. pubescent: infl. axillary..... 2. *V. pectinata*
  - BB. Habit not prostrate.
    - C. Infl. axillary, main st. continuing as leafy shoot..... 3. *V. Teucrium*
    - CC. Infl. terminal.
      - D. Lvs. entire or slightly crenate.
        - E. Foliage and sts. not white-tomentose..... 4. *V. gentianoides*
        - EE. Foliage and sts. white-tomentose..... 5. *V. incana*
      - DD. Lvs. serrate.
        - E. Racemes solitary or few: lvs. ovate or cordate at base..... 6. *V. longifolia*
        - EE. Racemes panicle: lvs. narrow or cuneate at base..... 7. *V. spuria*
  - AA. Plant a shrub (HEBE).
    - B. Margin of lvs. coarsely serrate..... 8. *V. Hulkeana*



BB. Margin of lvs. entire.

C. Lvs. strictly scale-like..... 9. *V. cupressoides*

CC. Lvs. not scale-like.

D. Length of lvs. 2 in. or more.

E. Racemes broad and dense, not much longer than lvs.: lvs. obovate, obtuse..... 10. *V. speciosa*

EE. Racemes slender, longer than lvs.: lvs. lanceolate, acute..... 11. *V. salicifolia*

DD. Length of lvs. rarely more than 1 in.

E. Fls. spicate: lvs. imbricate.

F. Lf. very short-petioled, keeled by prominent midrib..... 12. *V. buxifolia*

FF. Lf. sessile and somewhat amplexicaul, not keeled, nerveless..... 13. *V. amplexicaulis*

EE. Fls. racemose: lvs. not imbricate.

F. Diam. of fls.  $\frac{1}{2}$  in. or more..... 14. *V. elliptica*

FF. Diam. of fls.  $\frac{1}{4}$  in..... 15. *V. Traversii*

1. *V. repens*, DC. A low delicate moss-like creeper good for ground-cover: lvs. to  $\frac{1}{2}$  in. long, ovate, slightly crenate, shining green: racemes slender, few-fl.; fls. rose or nearly white, with a trace of blue, in spring: caps. broader than long, deeply notched, exceeding the sepals. Corsica.—There is a white-fl. var.

2. *V. pectinata*, L. Spreading prostrate herb rooting at the nodes, white-pubescent: lvs. obovate or spatulate,  $\frac{1}{2}$  in. long, sometimes pinnatifid, crenate, pubescent, narrowed at base and sessile: fls. deep blue with white center, in elongated many-fl. racemes in late spring: caps. longer than broad, notched, pubescent, exceeding the sepals. Asia Minor.—There is a kind with rosy fls.

3. *V. Teucrium*, L. Pubescent perennial; sterile sts. prostrate, floral sts. numerous from an ascending base or erect: lvs. sessile or the lower ones short-petioled, oblong- or linear-lanceolate, obtusely crenate or remotely toothed: racemes 2-4 from the upper axils, elongated; fls. large, blue, rarely rose or white: caps. about length of calyx. (Named for Teucer, the first king of Troy.) Eu., Cent. Asia.—Runs into prostrate and broad-leaved vars. *V. rupestris* of the trade is probably a form of this species.

4. *V. gentianoides*, Vahl (*V. glaber*, Hort.). Sts. tufted, erect, simple, 6 in. to 2 ft. high: lvs. thickish, glabrous or glandular-pilose, entire or small crenate, the lower forming rosettes, oblong-lanceolate, the upper lvs. remote, linear-lanceolate: racemes elongated, laxly many-fl., hairy: fls. pale blue with darker streaks, long-pedicelled: caps. twice as long as calyx. S. E. Eu.—Runs into white-fl. and variegated vars.

5. *V. incana*, L. (*V. candida*, Hort.). Upright or ascending white-woolly plant 1-2 ft. high, with many sterile matted branches: lvs. opposite, petioled, oblong or lanceolate, narrowed at base, obtusely crenate: racemes often solitary; fls. many, blue, short-pedicelled: caps. exceeding the woolly calyx. N. Asia, Russia.—Hort. vars., as *candidissima* and *glauca*, refer to different degrees of hoariness.

6. *V. longifolia*, L. (*V. maritima*, L.). Sts. upright, glabrous or slightly pubescent, to 2 ft. high: lvs. opposite or ternately whorled, petioled, lanceolate or oblong, acute, ovate or cordate at base, sharply serrate: racemes solitary or few, densely-fl.; fls. lilac; pedicels shorter or rarely longer than calyx: caps. about length of calyx: plant becomes black when dried. N. Eu. and N. Asia.—A useful border plant running into many vars., the most frequent of which is var. *subsessilis*, Miq. (*V. subsessilis*, Hort.), with very short-petioled lvs. and larger deep blue fls. Color forms and those with glaucous or villous lvs. are sometimes grown. The plants cult. under the name of *V. spicata* appear to belong to this species; the true *V. spicata*, L., is a small more pubescent plant 6-18 in. high from an ascending base, with obtusely crenate blunter lvs.

7. *V. spuria*, L. (*V. paniculata*, L. *V. amethystina*, Willd.). Closely allied to the preceding, differing in the lvs. being narrow or cuneate at base and the racemes paniced. S. E. Eu., Siberia.

8. *V. Hulkeana*, F. Muell. Laxly branched shrub 1-3 ft. high: lvs. in distant pairs, ovate or oblong-ovate, 1-2 in. long, coarsely serrate, dark green and glossy: panicle terminal, much-branched, 6-12 in. long; fls. numerous, small, about  $\frac{1}{4}$  in. across, sessile, pale lilac: caps. twice as long as calyx. New Zeal.

9. *V. cupressoides*, Hook. f. Globose closely branched shrub 3-5 ft. high; branches very slender, clothed with decussate scale-like lvs. resembling cypress: lvs. in distant pairs,  $\frac{1}{5}$  in. or less long, ovate-oblong, rather fleshy: fls. in small terminal heads, small,  $\frac{1}{4}$  in. or less diam., bluish-purple or rarely white: caps.  $\frac{1}{2}$  in. long, about twice as long as calyx, obovoid, narrow. New Zeal.

10. *V. speciosa*, R. Cunn. Stout glabrous shrub 2-5 ft. high, with spreading leafy branches: lvs. obovate or obovate-oblong, 2-4 in. long, almost sessile, rounded

at apex, entire, thick, dark green and glossy: racemes axillary, near tips of branches, broad and dense, not much longer than lvs.; fls. large,  $\frac{1}{2}$  in. diam., reddish-purple: caps. more than twice as long as calyx. New Zeal.—A variable species running into color and variegated forms. It hybridizes freely; the best known garden hybrid is *V. Andersonii*, Lindl. & Paxt. (*V. salicifolia*  $\times$  *V. speciosa*. *V. speciosa* var. *Andersonii*, Hort. *V. Hendersonii*, Hort.). Intermediate between the parents, the lvs. narrower and thinner than in *V. speciosa* but broader than in *V. salicifolia*: infl. with fls. white at bottom and rich violet at top. Raised by Mr. Anderson near Edinburgh. *V. imperialis*, Hort., is probably a product of the same cross.

11. *V. salicifolia*, Forst. A much-branched shrub 2–10 ft. high: lvs. almost sessile, lanceolate, 2–6 in. long, acute, entire, glabrous, rather thin: racemes slender, longer than lvs., many-fl.; fls. small,  $\frac{1}{2}$  in. or less diam., white tinged with lilac or blue: caps. about twice as long as calyx. New Zeal.—Very variable, appearing in many vars. It hybridizes freely with related species.

12. *V. buxifolia*, Benth. A stout glabrous shrub to 5 ft. high: lvs. closely imbricate, to  $\frac{1}{2}$  in. long, broadly oblong-obovate, truncate at base, keeled by the prominent midrib, entire, very thick, dark green and glossy above, paler and usually minutely dotted beneath: fls. white,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., sessile, in spikes in the axils of the upper lvs. forming a corymbose head: caps. almost twice as long as calyx. New Zeal.—Prostrate and globular forms are known.

13. *V. amplexicaulis*, Armstr. Erect or decumbent shrub to 3 ft. high, with spreading branches: lvs. imbricate, oblong or elliptic-oblong,  $\frac{1}{2}$ –1 in. long, obtuse, sessile and somewhat amplexicaul at base, nerveless and not keeled, very thick and glaucous: fls. white,  $\frac{1}{4}$  in. diam., sessile, in stout dense-fl. spikes in axils of upper lvs.: caps. longer than calyx. New Zeal.

14. *V. elliptica*, Forst. (*V. decussata*, Ait.). A much-branched shrub or small tree 5–20 ft. high, glabrous: lvs. elliptic-oblong,  $\frac{1}{2}$ –1 in. long, apiculate, petiolate, close-set, truncate at base, midrib prominent beneath, entire, margins edged with white pubescence, thick, pale green: racemes near tips of branches, short, 4–12-fl.; fls. large,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam., white with purple lines, sweet-scented: caps. twice as long as calyx. New Zeal., subantarctic S. Amer.—Variegated kinds are advertised.

15. *V. Traversii*, Hook. f. Dense glabrous shrub forming round bush 3–5 ft. diam.: lvs. elliptic- to linear-oblong,  $\frac{1}{2}$ –1 in. long, acute, entire, thick: racemes near tips of branches, 1–3 in. long, many-fl.; fls. small,  $\frac{1}{4}$  in. diam., white: caps. twice as long as calyx. (Named for W. T. L. Travers, who collected in New Zeal. about 1850.) New Zeal.

2. **REHMANNIA**, Libosch. (*Sparmannia*, Buchoz, not L.f.). Five or more species of perennial sticky hairy herbs from China and Japan, grown in a cool greenhouse or out-of-doors in the S.—Sts. branching from the base, in cult. tall and few-leaved: lvs. alternate, obovate or oblong, coarsely toothed: fls. large, borne in the axils of the lvs. or in terminal racemes, short-pedicelled; calyx ovoid, campanulate, 5-cleft at top; corolla slightly incurved, the tube ventricose, limb oblique, the lobes spreading, the rear or inner one 2-cleft, the front lobe 3-cleft; stamens 4, included: caps. broad, almost inclosed by calyx, loculicidally dehiscent; seeds numerous. (Rehmannia: Jos. Rehmann, 1779–1831, physician in Petrograd.)

Lvs. with many marginal teeth, or if lobed these are again toothed.....1. *R. angulata*  
Lvs. with 2–6 entire lobes.....2. *R. elata*

1. *R. angulata*, Hemsl. From 1–3 ft. high: lvs. either having many marginal teeth, or the few lobes or large teeth being again toothed: bracts with very broad and rather abruptly cuneate bases wider than any other part of blade: corolla about 2 in. long, red with band of scarlet at margin of upper lip and orange dots inside lower lip. China.—Garden forms are var. *tigrina*, Hort., with fls. marked, and var. *tricolor*, Hort., with fls. at first bright purple, later almost violet-rose, upper lip shaded with vermilion and throat whitish, spotted with purple.

2. *R. elata*, N. E. Br. (*R. angulata*, Hort., not Hemsl.). Differs from the above by being about twice as large: lvs. with 2–6 acute entire lobes on each side: bracts with long cuneate bases not broader than the blade nearer the apex: corolla slightly larger and bright rosy-purple on lips, yellow dotted with red in throat. China.

3. **DIGITALIS**, L. FOXGLOVE. About 25 species from Eu. and W. and Cent. Asia, useful for the herbaceous border.—Herbs, rarely woody at base,

glabrous, tomentose or villous, usually simple: lvs. alternate, lower often crowded and elongated, entire or dentate: fls. in long terminal racemes often one-sided, showy, purple, yellowish, or white; calyx 5-parted; corolla declined, tube inflated or campanulate, often constricted above the ovary, the limb erect-spreading and somewhat 2-lipped; stamens 4, usually included: caps. ovate, septicidally dehiscent; seeds numerous. (*Digitalis*: Latin, finger of a glove, referring to the shape of the fls.)

Middle lobe of lower lip markedly longer than others.....1. *D. lanata*

Middle lobe of lower lip not markedly longer than others.

Calyx-lobes linear.....2. *D. ambigua*

Calyx-lobes broadly ovate.....3. *D. purpurea*

1. *D. lanata*, Ehrh. Perennial or biennial, 2-3 ft., sts. strict and unbranched: lvs. many, long-lanceolate, somewhat ciliate or smooth, sessile: racemes closely many-fld., downy with many long soft hairs; calyx-lobes linear, downy, shorter than corolla, as are also the lanceolate bracts; corolla about 1 in. long, half of which is an urn-shaped closely brown-reticulated body with very short upper and lateral teeth: middle lower lobe about as long as body and projecting, pointed, nearly white with fine veins. Danube region and Greece.

2. *D. ambigua*, Murr. (*D. grandiflora*, Lam.). Perennial or biennial 2-3 ft. high, hairy: lvs. ovate-lanceolate, toothed, sessile: fls. large, 2 in. long, yellowish marked with brown; calyx-lobes linear; middle lobe of lower lip shorter than the corolla-tube; lower bracts about as long as fl. Eu., W. Asia.

3. *D. purpurea*, L. COMMON FOXGLOVE. Biennial, sometimes perennial, 2-4 ft. high: lvs. rugose, somewhat downy, the radical ones long-stalked and ovate to ovate-lanceolate, the st.-lvs. short-stalked or sessile, becoming small toward top of st.: fls. large, 2-3 in. long, pendulous, borne in a one-sided raceme 1-2 ft. long, purple more or less spotted, lobes ciliate; calyx-lobes broadly ovate: caps. ovoid, exceeding the calyx. W. Eu.—Variable, running into many garden forms as: Var. *gloxiniæflora*, Vilm. (*D. gloxinoides*, Carr.), of more robust habit, having longer racemes and more wide open fls. strongly spotted; var. *campanulata*, Vilm., with upper fls. united into a bell-shaped large bloom; and vars. with white, rosy, and spotted fls.

4. *ISOPLEXIS*, Lindl. Two species of subshrubs from the Canary Isls., grown in the open in Calif.—Lvs. alternate: fls. in dense terminal racemes, yellow; calyx 5-parted; corolla incurved, tube ventricose, upper lip as long as or longer than under lip; stamens 4, shorter than corolla and slightly exserted; style 2-lobed at top: caps. ovate, septicidally dehiscent; seeds numerous. (*Isoplexis*: Greek *equal* and *cut*, referring to the lips of the corolla being equal.)

*I. canariensis*, Steud. (*Digitalis canariensis*, L.). Undershrub with stiff erect sts., 3-4 ft., lightly pilose: lvs. thick, persistent, usually crowded, lanceolate to oblanceolate or somewhat broader, pointed, narrowed to partly clasping base, sharp-serrate, shining above and lighter beneath: fls. yellow-brown, in a dense terminal bracted spike, strongly bilabiate with long acute or obtuse lobes; stamens included under upper lip, the corolla about 1 in. long when fully expanded: caps. conic, tipped with style. Canary Isls., grown in S. Calif., sometimes as *I. Sceptum*, Steud., but in that species the corolla is not bilabiate, lobes very obtuse and half or less as long as tube, fls. drooping in a dense head which is comose at top.

5. *HEBENSTRETIA*, L. Annual herbs, subshrubs, or shrubs, of about 30 species mostly from S. Afr., one sometimes grown in the flower-garden.—Lvs. alternate or lower ones opposite, entire or dentate: fls. sessile in dense terminal spikes, yellow or white; calyx spathe-like, split down the front; corolla with slender tube, deeply cut in front, with 4-lobed posterior limb; stamens 4, inserted on corolla-tube; style entire: fr. indehiscent. (*Hebenstretia*: after John Ernst Hebenstreit, 1703-1757, professor of medicine in the Univ. of Leipzig.)

*H. comosa*, Hochst. To 4 ft. high: lvs. numerous, lanceolate,  $\frac{1}{2}$ -2 in. long, remotely sharp-toothed, glabrous: fls. yellow or white with orange-red blotch on limb, very fragrant at night, in mignonette-like spikes 2-6 in. long.

6. **VERBASCUM**, L. MULLEIN. Probably 300 species of biennial herbs, rarely perennial or subshrubs, native to the Medit. region, several escaped in N. Amer., a few species sometimes grown in the border.—Lvs. all alternate, entire, crenulate, dentate or pinnatifid: fls. in terminal spikes or racemes; calyx usually deeply 5-parted; corolla rotate, the tube almost none, with 5 broad slightly unequal lobes; stamens 5, the 3 posterior or all bearded: caps. globose or ovoid, septicidally dehiscent by 2 valves; seeds numerous. (Verbascum: classical Latin name.)

- Color of fls. purple, red, or white .....1. *V. phæniceum*  
 Color of fls. yellow.  
 Anthers all alike, kidney-shaped .....2. *V. olympicum*  
 Anthers of lower and longer stamens almost parallel with filament  
 and attached to it.  
 Fls. nearly sessile. ....3. *V. thapsiforme*  
 Fls. with pedicels as long as or longer than calyx. ....4. *V. longifolium*

1. **V. phæniceum**, L. PURPLE MULLEIN. To 5 ft. high: lvs. glabrous above, pubescent beneath; radical lvs. petiolate, ovate or oblong-rhomboid, obtusely crenate or repand; cauline lvs. few, small, oblong or lanceolate, sessile: fls. in a simple slender nearly glabrous raceme, purple or red (white in a var.); calyx glandular, obtuse segms. elliptical; filaments purple-woolly. S. E. Eu., E. Asia.

2. **V. olympicum**, Boiss. To 5 ft. high, densely white-tomentose: lower lvs. oblong or lanceolate, entire, attenuate at base; upper lvs. lanceolate, subcordate at base: racemes very long, fascicles many-flid.; fls. about 1 in. across, bright yellow; pedicels two to three times longer than the white-tomentose calyx; filaments white-bearded, anthers kidney-shaped, all alike: caps. twice longer than calyx. Greece.

3. **V. thapsiforme**, Schrad. (*V. densiflorum*, Bertol.). To 5 ft. high, densely yellowish-tomentose: lower lvs. oblong-elliptic or elliptic-lanceolate, attenuate at base into petiole; cauline lvs. narrowly decurrent: fls. yellow, nearly sessile on the long spike; calyx with lanceolate tomentose segms.; anthers adnate-decurrent. (Thapsiforme suggests the relation of the plant to the common mullein, *V. Thapsus*.) Eu., Cent. Russia.

4. **V. longifolium**, Ten. To 4 ft. high, white- or yellowish-tomentose: lvs. numerous, densely superimposed, undulate; lower to 2 ft. long, oblong; upper oblong-lanceolate, base amplexicaul: racemes about 1 ft. long, densely-flid.; fls. with pedicels as long as or longer than calyx, golden-yellow, 1 in. across; anthers of lower stamens adnate-decurrent; filaments glabrous, short filaments white- or violet-bearded. S. Eu.—Var. **pannosum**, Hort., is more densely tomentose and the fls. often larger.

7. **CELSIA**, L. About 40 species of biennial or perennial herbs, mostly from the Medit. region and Asia, 1 from S. Afr.—Differs from Verbascum only in having 4 stamens instead of 5. (Celsia: Olaus Celsius, 1670–1756, Swedish theologian and naturalist, teacher of Linnæus.)

- Fls. almost sessile. ....1. *C. cretica*  
 Fls. long-pedicelled. ....2. *C. Arcturus*

1. **C. cretica**, L. f. Sts. erect, simple: lvs. ovate or oblong, dentate, the lower petioled, lyrate-pinnatifid or undivided: bracts lanceolate, serrate or entire, longer than calyx: fls. in lax racemes, almost sessile, yellow marked with purple; shorter filaments violet-bearded, longer glabrous: caps. glabrous, shorter than calyx. Medit. region.

2. **C. Arcturus**, Jacq. Differs from *C. cretica* in the long-pedicelled fls., the triangular denticulate bracts being much shorter than the pedicels, the filaments all violet-bearded, and the caps. almost three times length of calyx. Crete and Asia Minor.

8. **ANTIRRHINUM**, L. SNAPDRAGON. About 40 herbaceous species native in the northern hemisphere, particularly in N. Amer., popular in flower-gardens and under glass.—Lvs. opposite or upper ones alternate, entire: fls. in terminal racemes or solitary in the axils of lvs.; calyx 5-parted; corolla saccate or gibbous at base, not spurred, upper lip erect and 2-lobed, lower 3-lobed and spreading, throat almost closed by palate; stamens 4: caps. ovoid



or globose, opening by pores below the summit. (Antirrhinum: Greek for like and nose, referring to shape of fls.)

- Plant erect.....1. *A. majus*  
 Plant climbing.....2. *A. maurandioides*

1. *A. majus*, L. COMMON or LARGE SNAPDRAGON. Perennial 1-3 ft. high, not downy except in fl.-cluster: lvs. lanceolate or oblong-lanceolate, entire: fls. large, to 1½ in. long, in elongated terminal spikes or racemes, in many colors from red and purple to white. Medit. region, escaped in Atlantic states.—Many named forms are in the trade.

2. *A. maurandioides*, Gray (*Maurandia antirrhiniflora*, Willd.). Climbing to 6 ft. by means of coiling petioles and peduncles: lvs. halberd-shaped: fls. to 1 in. long, axillary, purple or sometimes white. Tex. to Calif.

9. **MAURANDIA**, Ort. Climbing herbs with showy fls., comprising about 6 species from Mex.—Lvs. alternate or the lower ones opposite, triangular or halberd-shaped, angular-lobed or coarsely toothed: fls. axillary; calyx 5-parted; corolla-tube slightly gibbous at base, throat open, marked with bearded lines; stamens 4: caps. opening by oblique or irregular valves; seeds many. (Maurandia: after Maurandy, promoter of botany at Cartagena, Spain.)

- Lvs. entire: calyx-segms. narrow.....1. *M. Barclaiana*  
 Lvs. serrate: calyx-segms. broad and leafy.....2. *M. Lophospermum*

1. *M. Barclaiana*, Lindl. Lvs. hastate, cordate, entire, the petioles long and twining: fls. about 1½ in. long, on long pedicels, purple, downy outside; calyx glandular-pilose, segms. long-attenuate. (Bears the name of Robt. Barclay who collected in Mex.) Mex.—Runs into many color forms.

2. *M. Lophospermum*, Bailey (*M. scandens*, Gray. *Lophospermum scandens*, D. Don). Branches glandular-pubescent: lvs. triangular-ovate, cordate, unequally serrate, petioles twining: fls. about 3 in. long, on long pedicels, rose-purple, obscurely dotted outside, tube white; calyx-segms. 1 in. long, broad and leafy. Mex.

10. **LINARIA**, Mill. Mostly annual or perennial herbs suitable for the flower-garden; over 100 species widely distributed in the temp. parts of the northern hemisphere.—Lvs. opposite or verticillate or the upper ones alternate, pinnate-veined, entire, dentate or lobed: fls. in terminal racemes or spikes, of many colors; calyx 5-parted; corolla with long tube, long-spurred at base, the palate often nearly closing the throat; stamens 4, filaments and style filiform: caps. dehiscent by 1 or more mostly 3-toothed pores or slits below the summit. (Linaria: Latin *linum*, flax, which the lvs. of some species resemble.)

- Fls. yellow.....1. *L. macedonica*  
 Fls. violet, purple, or rose,  
 Pedicels shorter than calyx.....2. *L. reticulata*  
 Pedicels longer than calyx.  
 Spur slightly shorter than remainder of corolla.....3. *L. bipartita*  
 Spur half as long again as corolla.....4. *L. maroccana*

1. *L. macedonica*, Griseb. Robust branching perennial to 3 ft. high, grayish-green and glabrous: lvs. ovate-lanceolate, nearly sessile, entire, somewhat cordate at base: fls. bright yellow marked with orange-yellow on palate. Macedonia.

2. *L. reticulata*, Desf. Annual 2-4 ft. high, glaucous: lvs. linear: racemes pubescent, short; pedicels shorter than calyx; fls. purple, reticulately veined, palate yellow or orange, spur about as long as corolla, pointing downward. Portugal, N. Afr.—Runs into deeper color vars.

3. *L. bipartita*, Willd. Annual, about 1 ft. high, glabrous: lvs. linear: fls. violet-purple, in lax racemes, palate orange-colored, whitish at base, upper lip deeply 2-parted, spur curved, not quite as long as corolla, standing oblique or horizontal; pedicels about three times longer than calyx. Portugal, N. Afr.—Vars. with white and deep purple fls. are cult.

4. *L. maroccana*, Hook. f. Annual to 1½ ft. high, glabrous below, viscid-pubescent above: lvs. to 1½ in. long, narrowly linear: racemes many-fl'd., elongating in fr.; corolla bright violet-purple with small yellow patch on center of palate,

spur often half as long again as fl. or pedicel, pointed, nearly parallel to axis of raceme; pedicels longer than calyx. Morocco.

11. **CYMBALARIA**, Hill. Nine Old World species of creeping perennial herbs, a few grown as ground-cover in greenhouses and the open.—Often united with *Linaria* but differing in the axillary solitary fls. and the palmately-veined lvs. (*Cymbalaria*: from the Greek for *cymbal*.)

Sts. and lvs. glabrous.

Lvs. mostly alternate, prominently lobed.....1. *C. muralis*

Lvs. mostly opposite, shortly or indistinctly lobed.....2. *C. hepaticæfolia*

Sts. and lvs. pilose.....3. *C. pilosa*

1. *C. muralis*, Gaertn., Mey. & Scherb. (*Antirrhinum Cymbalaria*, L. *Linaria Cymbalaria*, Mill. *C. Cymbalaria*, Wettst.). KENILWORTH-IVY. Glabrous; st. trailing and rooting at nodes: lvs. mostly alternate, cordate-orbicular or reniform, irregularly 3-7-lobed, on petioles usually longer than blades: fls. about 1/4 in. long, lilac-blue with yellowish throat: caps. longer than the linear-lanceolate sepals. Eu.; naturalized Ont. to Pa.—Runs into color variants.

2. *C. hepaticæfolia*, Wettst. (*Linaria hepaticæfolia*, Steud.). Distinguished from *C. muralis* by the lvs. being mostly opposite and with 3-5 short or indistinct lobes, the larger fls. and the caps. shorter than the linear sepals. Corsica.

3. *C. pilosa*, Bailey (*Linaria pilosa*, DC.). Plant pubescent or villous: lvs. opposite and alternate, cordate-reniform, 3-11-lobed: fls. lavender with yellow palate: caps. longer than the narrowly lanceolate sepals. Italy.

12. **NEMESIA**, Vent. Tender herbs or subshrubs of about 50 species from S. Afr., a few from trop. Afr., attractive for the flower-garden.—Lvs. opposite: fls. variable in color, in terminal racemes or rarely solitary in the axils; calyx 5-parted; corolla-tube short with spur or sac in front; lower lip entire or emarginate with palate at base, upper 4-cleft; stamens 4, the 1-celled anthers often cohering about the stigma: caps. septicidally dehiscent, with boat-shaped valves. (*Nemesia*: old name used by Dioscorides for some sort of snap-dragon.)

Fls. with sac or pouch at base.....1. *N. strumosa*

Fls. with spur at base.....2. *N. versicolor*

1. *N. strumosa*, Benth. St.-lvs. lanceolate or linear, dentate, sessile: fls. in terminal racemes, white or in shades of yellow and purple, often purple marked on the outside, the bearded throat spotted on a yellow ground. S. Afr.—Runs into many vars., var. *Suttonii*, Hort., being a series of improved forms.

2. *N. versicolor*,<sup>4</sup> E. Mey. St.-lvs. few, oblong, lanceolate or linear, entire or toothed: fls. in terminal racemes, variable in color; throat with 2 callosities, pubescent; spur incurved or nearly straight, about as long as lower lip. S. Afr.—Runs into many color forms. There is a free-flowering compact race, 8 in. to 1 ft. high. Hybrids between the spurred and saccate forms occur in cult.

13. **PAULOWNIA**, Sieb. & Zucc. About 8 species of Chinese trees, one planted for ornament.—Lvs. opposite, entire or 3-lobed, pubescent, petioled: fls. in terminal panicles; calyx deeply 5-cleft; corolla-tube elongated, enlarged above, lobes 5, spreading obliquely, somewhat unequal; stamens 4: caps. loculicidally dehiscent by 2 valves; seeds numerous, small, winged. (*Paulownia*: Anna Paulowna, princess of the Netherlands.)—The genus has strong affinities with *Bignoniaceæ*.

*P. tomentosa*, Steud. (*P. imperialis*, Sieb. & Zucc.). Tree to 40 ft., with the habit of catalpa: lvs. broadly cordate-ovate, 5-8 in. or more long, entire or 3-lobed, acuminate, long-petioled, pubescent above, tomentose beneath: fls. 2 in. or more long, showy, pale violet, fragrant, in many-fl. terminal panicles; pedicels and calyx densely rusty-tomentose; calyx-lobes short, rounded. China; cult. in Japan; escaped in the U. S. from S. N. Y. to Ga.—There are vars. with whitish fls. and with lvs. more densely yellow-tomentose beneath.

14. **PHYGELIUS**, E. Mey. Two species of small shrubs from S. Afr., one of which is grown in greenhouses or planted out-of-doors.—Lvs. glabrous,

opposite or sometimes upper ones alternate, petioled, crenate: fls. in terminal panicles, scarlet, drooping; calyx 5-parted; corolla-tube elongated, curved or almost straight, with 5 nearly equal rounded lobes; stamens 4, exserted; style filiform: caps. septicidally dehiscent. (Phyge-lius: Greek *sun flight*, referring to its supposed shade-loving habit.)

**P. capensis**, E. Mey. CAPE-FUCHSIA. To about 3 ft., glabrous, st. 4-angled or narrowly winged: lvs. ovate or ovate-lanceolate, bluntly small-toothed: fls. showy, 2 in. long, on ends of straight-spreading peduncles; tube somewhat curved, slender. Cape of Good Hope.

15. **RUSSELIA**, Jacq. Fifteen or more species of shrubs in trop. Amer., one of which is grown in greenhouses and in the open far S.—Lvs. opposite or verticillate, often reduced to scales on the branches: fls. in bracteate dichotomous cymes, many-fld. or sometimes only 1, red; calyx deeply 5-cleft or 5-parted; corolla-tube cylindrical, somewhat 2-lipped, 5-cleft, the lobes rounded; stamens 4, included: caps. subglobose, septicidally dehiscent. (Russel-ia: Alexander Russell, English physician and traveler, died 1768.)

**R. equisetiformis**, Schlecht. & Cham. (*R. juncea*, Zucc. *R. scoparia*, Hort.). CORAL-PLANT. FOUNTAIN-PLANT. Much-branched shrub 1–4 ft. high, glabrous, branches rush-like, nodding or pendulous at top; sts. sharply 4-angled: lvs. ovate or linear-lanceolate, mostly reduced to minute bracts on the branches: peduncles elongated, 1–3-fld. Mex.; naturalized in Fla. and W. Indies.—**R. sarmentosa**, Jacq., may be distinguished by its many-fld. short peduncles and the lvs. never reduced to scales. Reputed hybrids between *R. equisetiformis* and *R. sarmentosa* are known under the garden names of *R. Lemoinei* and *R. elegantissima*; these are more floriferous forms.

16. **COLLINSIA**, Nutt. Hardy annual herbs, of more than 20 species, native mostly in W. N. Amer.—Lvs. opposite or verticillate in 3's: fls. in axils of lvs., solitary or in umbel-like clusters; calyx campanulate, 5-cleft; corolla with short tube, bilabiate, upper lip 2-lobed, recurved, lower lip 3-lobed, the side lobes drooping or spreading, inclosing the 4 stamens; fifth stamen reduced to a gland; style filiform, capitate: caps. septicidally dehiscent; seeds few. (Collin-sia: after Zaccheus Collins, 1764–1831, Philadelphia botanist.)

|                                       |                          |
|---------------------------------------|--------------------------|
| Pedicels very short, almost none..... | 1. <i>C. bicolor</i>     |
| Pedicels longer than fls.....         | 2. <i>C. verna</i>       |
| Pedicels about as long as fls.....    | 3. <i>C. grandiflora</i> |

1. **C. bicolor**, Benth. From 1–2 ft. high, glabrous, hairy or viscid: lvs. oblong or lanceolate, dentate, upper sessile: pedicels shorter than the acute calyx-lobes; lower lip of corolla violet or rose-purple, upper lip white. Calif.—Several vars. are in cult. with variegated and white fls.

2. **C. verna**, Nutt. To 2 ft. high, simple or branched: lower lvs. ovate, slender-petioled, upper ovate-lanceolate, clasping, dentate: whorls about 6-fld., with pedicels longer than the fls.; corolla more than twice as long as calyx; lower lip bright blue, upper white or purplish, the lobes blunt. W. N. Y. and Pa. to Wis. and Ky.

3. **C. grandiflora**, Lindl. Very similar to *C. verna* but differs in its more branching habit, the pedicels only about the length of the fls., calyces more pointed and longer in proportion to the fl., lobes of corolla dilated and retuse, and the upper lip purple. Calif. to B. C.

17. **PENSTEMON**, Mitch. About 150 species of perennial herbs or shrubs, native in N. Amer., Mex., and 1 species in N. E. Asia, furnishing many ornamental subjects.—Sparingly branched: lvs. opposite or whorled, lower ones petioled, upper sessile: fls. in terminal racemes or panicles, showy; calyx 5-parted, segms. imbricated; corolla-tube elongated, usually dilated at throat, more or less bilabiate, upper lip 2-lobed, lower lip 3-lobed; fertile stamens 4, the fifth sterile stamen about as long as others, naked or bearded; style filiform, stigma capitate: caps. septicidally dehiscent; seeds numerous, wingless.

(Penste-mon: Greek *five stamens*, the fifth stamen being present, although sterile. Commonly written Pentstemon; Penstemon is the older, 1762.)

- A. Fls. yellow..... 1. *P. antirrhinoides*
- AA. Fls. red..... 2. *P. barbatus*
  - B. Lower lip bearded..... 3. *P. Torreyi*
  - BB. Lower lip not bearded..... 4. *P. cordifolius*
    - C. Corolla  $1\frac{1}{4}$  in. or less long..... 5. *P. centranthifolius*
    - DD. Lvs. linear..... 6. *P. Hartwegii*
    - EE. Plant partially climbing: lvs. serrate.....
    - EE. Plant erect: lvs. entire.....
  - CC. Corolla 2 in. long.....
- AAA. Fls. blue, purple or white.....
- B. Margin of lvs. entire.....
  - C. Main st.-lvs. ovate to obovate..... 7. *P. grandiflorus*
  - DD. Corolla about 1 in. long..... 8. *P. cyananthus*
  - CC. Main st.-lvs. lanceolate to ovate-lanceolate.....
    - D. Plant dwarf, usually 1 ft. or less high..... 9. *P. alpinus*
    - DD. Plant taller, 1-5 ft. high.....
      - E. Lvs. oblong- to ovate-lanceolate..... 10. *P. glaber*
      - EE. Lvs. mostly linear or lanceolate..... 11. *P. heterophyllus*
  - BB. Margin of lvs. serrate..... 12. *P. Cobæa*
    - C. Corolla 2 in. long.....
    - CC. Corolla  $\frac{3}{4}$ - $1\frac{1}{4}$  in. long..... 13. *P. spectabilis*
      - D. Sterile filament glabrous.....
      - DD. Sterile filament bearded.....
        - E. Sts. glabrous below the infl..... 14. *P. calycosus*
        - F. Calyx-lobes less than  $\frac{1}{2}$  in. long.....
        - FF. Calyx-lobes less than  $\frac{1}{2}$  in. long.....
          - G. Lvs. lanceolate to ovate-lanceolate, tips short-acuminate..... 15. *P. Digitalis*
          - GG. Lvs. narrow-lanceolate, tips long slender-acuminate..... 16. *P. campanulatus*
      - EE. Sts. pubescent or puberulent.....
        - F. St.-lvs. oblong or narrow lanceolate..... 17. *P. hirsutus*
        - FF. St.-lvs. broad-ovate, less than 2 in. long..... 18. *P. ovatus*
        - FFF. St.-lvs. ovate-lanceolate, more than 2 in. long.....
          - G. Corolla-tube abruptly dilated near middle..... 19. *P. Smallii*
          - GG. Corolla-tube uniformly funnelform..... 20. *P. diffusus*

1. *P. antirrhinoides*, Benth. Shrub up to 6 ft. high, branched and leafy: lvs. very small, oval or spatulate, entire: infl. a leafy panicle; peduncles 1-fld.; sepals broadly ovate; corolla very broad, ventricose, yellow; sterile filament densely bearded on one side. S. Calif.

2. *P. barbatus*, Roth (*Chelone barbata*, Cav.). To 6 ft. tall, glabrous: lower lvs. oblong or ovate; upper lvs. lanceolate or linear, entire: infl. long and open; peduncles 2-3-fld.; corolla about 1 in. long, red, strongly 2-lipped, the lower lip bearded with yellow hairs. Mts., Colo. south.

3. *P. Torreyi*, Benth. (*P. barbatus* var. *Torreyi*, Gray). Differs from *P. barbatus* in its larger scarlet fls. and the lower lip not being bearded. (For John Torrey, page 79.) Colo. south.

4. *P. cordifolius*, Benth. Somewhat pubescent very leafy plant half climbing over shrubs: lvs. ovate, 1 in. or less long, truncate or subcordate at base, serrate: infl. short and leafy; fls. about  $1\frac{1}{4}$  in. long, scarlet, tubular with short lobes; sterile filament bearded. S. Calif.

5. *P. centranthifolius*, Benth. From 1-3 ft. high, glaucous: lvs. thick, entire, from ovate- to oblong-lanceolate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, the upper with subcordate clasping base: infl. long and narrow; peduncles 2-3-fld.; fls. about 1 in. long, scarlet, tubular, the lobes very short; sterile filament naked. Calif. to W. Ariz.

6. *P. Hartwegii*, Benth. From 3-4 ft. high, with dark purple sts.: lvs. lanceolate to oblong-lanceolate, entire: infl. long and open; peduncles 2-6-fld.; fls. to 2 in. long, scarlet, slightly curved. (Hartwegii: page 408.) Cool regions in Mex.—*P. gloxinoides*, Hort., is a race of hybrids between *P. Hartwegii* and *P. Cobæa*, many colors.

7. *P. grandiflorus*, Nutt. From 2-6 ft. high, glabrous: st.-lvs. broadly ovate, obtuse, entire: fls. about 2 in. long, lavender-blue, tube abruptly dilated above calyx; sterile filament minutely pubescent at tip. Prairies, Ill. and Minn. westward.

8. *P. cyananthus*, Hook. (*P. glaber* var. *cyananthus*, Gray). From 1-3 ft. high, glabrous and glaucous: st.-lvs. ovate or subcordate: corolla about 1 in. long, slightly ventricose, bright blue. Mts., Utah, Ida., Wyo.



9. *P. alpinus*, Torr. (*P. glaber* var. *alpinus*, Gray). Usually not more than 1 ft. high; st.-lvs. lanceolate, 2-4 in. long, entire; infl. dense; corolla bluish-purple, more or less ventricose; sterile stamen yellow-bearded at end. Rocky Mts.

10. *P. glaber*, Pursh. From 1-2 ft. high, glabrous and somewhat glaucous: st.-lvs. oblong-to ovate-lanceolate, entire; infl. densely many-fld.; corolla 1 in. or more long, blue or purple, somewhat ventricose; sterile stamen bearded at tip. N. D. to Wyo. and Ariz.

11. *P. heterophyllus*, Lindl. Sts. to 5 ft. high, from a woody base: lvs. lanceolate or linear, entire; infl. loose and open; peduncle usually 1-2-fld.; corolla 1 in. or more long, purple or pinkish-blue, slender at base but dilated above; sterile filament glabrous. Calif.

12. *P. Cobæa*, Nutt. To 2 ft. high, stout, minutely pubescent: lvs. oblong to ovate, 3-5 in. long, dentate; infl. open; peduncles several- to many-fld.; fls. about 2 in. long, purple, tube abruptly dilated above calyx, the limb scarcely 2-lipped; sterile filament bearded. (*Cobæa*: fls. *cobæa*-like.) Mo. and Kans. to Tex.

13. *P. spectabilis*, Thurb. From 2-6 ft. high, glabrous and glaucescent: lvs. ovate to ovate-lanceolate, the upper ones connate at base, sharply dentate; infl. long, many-fld.; fls. 1 in. or more long, rose-purple or lilac, the narrow part of tube about twice length of calyx, upper part dilated; sterile filament glabrous. New Mex. to S. Calif.

14. *P. calycosus*, Small. From 1-4 ft. high; sts. glabrous below the sparingly pubescent infl.: upper st.-lvs. lanceolate or ovate-lanceolate, sharply serrate or nearly entire; fls. about 1 in. long, purple; corolla-tube abruptly dilated at middle; calyx-lobes becoming fully  $\frac{3}{4}$  in. long; sterile filament bearded. Ky., Mo. south to Ala. and Ark.

15. *P. Digitalis*, Nutt. (*P. lævigatus* var. *Digitalis*, Gray). Up to 5 ft. high, glabrous below infl.: upper st.-lvs. oblong, lanceolate or ovate-lanceolate, sharply denticulate; infl. open, many-fld.; fls. white or pinkish, about 1 in. long, tube abruptly dilated at middle; calyx-lobes less than  $\frac{3}{4}$  in. long; sterile filament bearded. Me. to Ill., south to Ga. and Ark.

16. *P. campanulatus*, Willd. (*Chelone campanulata*, Cav. *Gerardia tenuifolia*, Hort.). To 2 ft. high, glabrous below infl.: lvs. lanceolate, long-acuminate, strongly serrate; infl. long and narrow; peduncles 2-3-fld.; fls. about 1 in. long, rose-purple or violet, sometimes white, dilated at middle; sterile filament bearded. Mex. and Guatemala.

17. *P. hirsutus*, Willd. (*P. pubescens*, Soland. *Chelone hirsuta*, L.). From 1-3 ft. high, usually viscid-pubescent: st.-lvs. oblong to narrow-lanceolate, small-toothed; infl. loose and open; fls. purplish or violet, about 1 in. long, densely bearded in throat; sterile filament densely bearded above middle. Me. to Man., Fla., Tex.

18. *P. ovatus*, Dougl. From 2-4 ft. high; sts. more or less pubescent: lvs. broad-ovate, 2 in. or less long, serrate; infl. lax; peduncles several-fld.; fls. less than 1 in. long, blue changing to purple; lower lip bearded in throat; sterile filament bearded. Mont., Ida. to Wash.

19. *P. Smallii*, Heller. From 1-4 ft. high, sts. puberulent below infl.: st.-lvs. lanceolate to ovate-lanceolate, 3-6 in. long, rather finely toothed; fls. pink-purple striped with white within, about 1 in. long, tube abruptly dilated near middle, with long yellow hairs in throat; sterile filament bearded to base. (Named after J. K. Small, New York Botanical Garden.) N. C., Tenn.

20. *P. diffusus*, Dougl. From 1-2 ft. tall, diffuse, somewhat puberulent: lvs. ovate or lanceolate or upper subcordate, 2 in. or more long, unevenly and deeply serrate; infl. leafy, the pedicels very short; fls.  $\frac{3}{4}$  in. long, blue or purple; sterile filament hairy above. B. C. to Ore.

18. **CHELONE**, L. **TURTLE-HEAD**. Three or 4 species of perennial herbs native in N. Amer., grown in the hardy border.—Lvs. opposite, serrate; fls. sessile in dense axillary or terminal spikes; calyx 5-parted; corolla with elongated ventricose tube and 2-lipped limb, the upper lip concave and notched, the lower 3-lobed; stamens 4, the fifth sterile stamen shorter than others, filaments woolly; stigma capitate; caps. ovoid, septicidally dehiscent; seeds winged. (Chelone: Greek *tortoise*; the corolla resembling a turtle's head.)

Lvs. ovate, long-petioled; bracts ciliate.....1. *C. Lyoni*  
Lvs. narrow- to broad-lanceolate; bracts not ciliate.....2. *C. glabra*

1. *C. Lyoni*, Pursh. To 3 ft. high: lvs. ovate, 3-7 in. long, acuminate, long-petioled: fls. rose-purple, about 1 in. long, in July-Sept.; bracts ciliolate and puberulent. (Bears the name of John Lyon, American botanist, died before 1818.) Mts. Va. to Ga.

2. *C. glabra*, L. To 3 ft. high: lvs. narrow- to broad-lanceolate,  $2\frac{1}{2}$ -6 in. long, acuminate, short-petioled: fls. white or rose-tinged, about 1 in. long, in July-Sept.; bracts glabrous, not ciliolate. Wet grounds, Newf. to Fla., west to Kans.

19. *ZALUZIANSKYA*, Schmidt (*Nycterinia*, Don). Nearly 40 species of herbs or subshrubs native in S. Afr., a few sometimes grown in the flower-garden.—Lower lvs. opposite, upper alternate, few-toothed, the floral lvs. very small and entire: fls. sessile in terminal spikes; calyx 2-lipped or 2-parted, 5-toothed; corolla with long tube and 5 spreading entire or bifid lobes; stamens 4 (rarely 2 by abortion), 2 inserted on corolla-tube and 2 on throat: caps. oblong, septicidally dehiscent. (Zaluzian-skya: after Adam Zaluziansky von Zaluzian, Polish physician in late 16th century.)

Lvs. linear or lower ones lanceolate: outside of corolla-tube short-pubescent. 1. *Z. capensis*  
Lvs. obovate or spatulate: outside of corolla-tube glabrous or nearly so . . . . 2. *Z. villosa*

1. *Z. capensis*, Walp. (*Nycterinia capensis*, Benth.). Erect or ascending annual to  $1\frac{1}{2}$  ft. high: lvs. linear or lower lanceolate,  $\frac{1}{2}$ -2 in. long, obtuse, entire or sparingly toothed: fls.  $1-1\frac{3}{4}$  in. long, white inside, purple-black and short-pubescent outside.

2. *Z. villosa*, Schmidt (*Z. selaginoides*, Walp. *Nycterinia selaginoides*, Benth.). Pubescent herb to 1 ft. high: lvs. obovate or spatulate,  $\frac{1}{4}$ -1 in. long, obtuse, attenuate at base, nearly entire: fls.  $\frac{1}{2}$ -1 in. long, white or lilac inside, purple and nearly glabrous outside; stamens 2.

20. *MAZUS*, Lour. Low herbs, sometimes grown in rock-gardens or as ground-cover, of about 6 species in Asia, Australia and Malay Archipelago.—Lower lvs. opposite or radical, upper mostly alternate, toothed or incised: fls. blue or white, in terminal subsecund racemes; calyx campanulate, 5-lobed; corolla 2-lipped, the upper erect and 2-lobed, the lower much larger, spreading, 3-lobed, with 2 prominent ridges in throat, the tube short or exceeding the calyx; stamens 4, inserted on corolla-tube; style 2-lobed: caps. globose or compressed, loculicidally dehiscent. (Ma-zus: Greek for *teat*, referring to the ridges of corolla.)

*M. japonicus*, Kuntze (*M. rugosus*, Lour.). Low trailing perennial, the flowering sts. sometimes to 1 ft. high: lvs. obovate-spatulate,  $\frac{1}{2}$ - $2\frac{1}{2}$  in. long, coarsely crenate-dentate: fls.  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, blue, the ridges of the lower lip brown-spotted and bearded with club-shaped hairs; tube of corolla longer than calyx. E. Asia.

21. *MIMULUS*, L. MONKEY-FLOWER. About 115 species of decumbent or erect herbs or sometimes shrubs, native in N. and S. Amer., Asia, Australia, S. Afr., particularly numerous in W. N. Amer., a few grown in the flower-garden.—Plants glabrous or pilose, often viscid or glandular-pubescent: lvs. opposite, entire or dentate: fls. solitary, axillary or in terminal racemes, usually showy; calyx tubular, 5-angled, 5-toothed; corolla-tube cylindrical; upper lip 2-lobed, reflexed or erect; lower 3-lobed, spreading; stamens 4, inserted on corolla-tube; style filiform with 2-lobed sensitive stigma: caps. oblong or linear, loculicidally dehiscent. (Mim-ulus: Latin diminutive of *mimus*, mimic actor, referring to the grinning fls.)

- A. Plant woody or shrubby.
  - B. Lvs. pubescent beneath.
    - c. Fls.  $1-1\frac{1}{2}$  in. long.
      - d. Color of fls. yellow: lvs. densely pubescent beneath. . . . . 1. *M. aurantiacus*
      - dd. Color of fls. red: lvs. sparsely pubescent beneath. . . . . 2. *M. puniceus*
    - cc. Fls. 2-3 in. long. . . . . 3. *M. longiflorus*
  - BB. Lvs. glabrous on both sides. . . . . 4. *M. leptanthus*
- AA. Plant herbaceous.
  - B. Foliage viscid-pubescent.

- c. Fls. yellow.  
 d. Calyx-teeth equal: perennial..... 5. *M. moschatus*  
 dd. Calyx-teeth unequal: annual..... 6. *M. brevipes*  
 cc. Fls. red.  
 d. Stamens exerted, with hairy anthers..... 7. *M. cardinalis*  
 dd. Stamens included, the anthers glabrous..... 8. *M. Fremonti*  
 BB. Foliage not sticky.  
 c. Corolla with open throat; pedicels longer than fls.  
 d. Mature fls. yellow, often spotted with red or purple..... 9. *M. luteus*  
 dd. Mature fls. copper-colored..... 10. *M. cupreus*  
 cc. Corolla bilabiate, with throat closed; pedicels usually shorter than fls..... 11. *M. guttatus*

1. *M. aurantiacus*, Wm. Curtis (*M. glutinosus*, Wendl. *Diplacus glutinosus*, Nutt.). Perennial shrub 2-6 ft. high: lvs. mostly narrow-oblong, denticulate, sessile, the margins becoming revolute, densely pubescent beneath: fls. deep yellow, 1-1½ in. long, short-pedicelled, the spreading lobes toothed or notched. Cent. and N. Calif.

2. *M. puniceus*, Steud. (*M. glutinosus* var. *puniceus*, Gray. *Diplacus puniceus*, Nutt.). Very similar to the above but with narrower lvs. which are only sparsely pubescent beneath, and red fls. S. Calif.

3. *M. longiflorus*, Grant (*Diplacus longiflorus*, Nutt. *M. glutinosus* var. *brachypus*, Gray). Low shrub to 3 ft. high: lvs. lanceolate, denticulate, the margins often revolute, pubescent beneath: fls. cream-color to salmon-yellow, 2-3 in. long; calyx and pedicels villous, the calyx-throat much expanded. S. Calif.

4. *M. leptanthus*, Grant (*M. glutinosus* var. *linearis*, Gray. *Diplacus leptanthus*, Nutt. *D. grandiflorus*, Groenl.). Differs from *M. longiflorus* in its narrower linear lvs. which are glabrous on both sides, and its larger yellow fls. S. Calif.

5. *M. moschatus*, Dougl. MUSK-PLANT. Perennial by spreading and creeping stolons, slimy-viscid-villous, with a musky odor: lvs. oblong-ovate, denticulate, petioled (except in var. *sessilifolius*): fls. pale yellow, lightly dotted with brown, about ½ in. long, long-pedicelled; calyx-teeth equal. Rocky Mt. and Pacific Coast states.

6. *M. brevipes*, Benth. Viscid-pubescent annual to 2 ft. high: lvs. lanceolate to linear, entire or denticulate: fls. yellow, campanulate, about 1 in. long, nearly sessile; calyx-teeth very unequal. Calif.

7. *M. cardinalis*, Dougl. Erect perennial to 4 ft. high, villous and viscid: lvs. ovate, sharply toothed, sessile: fls. scarlet, rarely yellow, 1½-2 in. long, on elongated pedicels, the tube longer than the limb which is markedly bilabiate; stamens exerted, the anthers bearded. Ore. and Calif. to Ariz.

8. *M. Fremonti*, Gray. (*Eunanus Fremonti*, Benth.). Glandular-pubescent low annual: lvs. narrowly oblong or the lowest spatulate, obtuse: fls. crimson, about ½ in. long, nearly sessile; stamens included, the anthers glabrous. Calif., where it was first collected by John Chas. Fremont.

9. *M. luteus*, L. Glabrous or puberulent perennial to about 1½ ft. high: lvs. ovate, roundish to subcordate, sharply toothed, the upper ones smaller, 5-7-nerved from base: fls. yellow, often with red or purple spots, in loose few-fld racemes, long-pedicelled, 1-2 in. long. Chile.—There are several color forms, as var. *rivularis*, Lindl., in which one lobe has a large brown spot, and var. *Youngeana*, Hook., each lobe with a spot, and var. *variegatus*, Hook., with pale yellow throat and the margins of the lobes pinkish-purple. Under the name *tigrinus* are offered the large-fld. bright-colored crosses of *M. luteus* and its vars. and *M. guttatus*.

10. *M. cupreus*, Dombrain. Of more compact growth than *M. luteus*, the lvs. 3-5-nerved, the fls. becoming brilliant copper-color and with more open throat. Chile.

11. *M. guttatus*, DC. (*M. Langsdorffii*, Donn). Glabrous perennial to 1½ ft. high: lvs. ovate, denticulate: fls. yellow, generally with purple or brown dots in throat, about 1 in. long, in many-fld. close racemes, the pedicels usually shorter than fls.; corolla bilabiate, with closed throat. Alaska to Mex.

22. **TORENIA**, L. Over 30 species of perennial or annual herbs from trop. Asia and Afr., mostly grown as garden annuals.—Plants glabrous, pubescent or hirsute: lvs. opposite, entire, crenate or serrate: fls. in short few-fld. racemes or axillary; calyx tubular, plicate or 3-5-winged; corolla-tube cylindrical or often broadened above, 2-lipped, the lower lip 3-lobed; stamens 4,

perfect, in 2 pairs of unequal length: caps. oblong, septicidally dehiscent. (Tore-nia: from Olaf Toren, Swedish clergyman, who discovered *T. asiatica* while traveling in China, 1750-2.)

**T. Fournieri**, Lind. Much branched, to 1 ft. high, glabrous; st. 4-angled: lvs. ovate or ovate-cordate, serrate,  $1\frac{1}{2}$ -2 in. long; petiole more than half as long as blade: fls. in upper axils or forming terminal racemes, on stout pedicels; calyx rather inflated, broadly 5-winged, obscurely ciliate; corolla-tube pale violet, yellow on back; upper lip pale blue, obscurely 2-lobed, lower lip of 3 purplish-blue rounded lobes the central one with yellow blotch at base. (Named for Eug. Fournier.) Cochín-China.—There are white-fl. vars. and also forms of compact habit. Other species of *Torenia* occasionally met with in cult. are **T. asiatica**, L., with the corolla-tube dark purple and a pale purple limb with a dark blotch on 3 of the 4 lobes, and **T. flava**, Buch.-Ham. (*T. Baillonii*, Godefroy), with yellow tube red-purple above and yellow limb with purple eye.

**23. DIASCIA**, Link & Otto. About 25 species of herbs from S. Afr., one of which is grown in flower-gardens.—Annual or rarely perennial tender herbs, diffuse or erect: lvs. usually opposite: fls. violet or rose, borne in axillary or fascicled racemes at ends of branches, racemes leafy or bracted; calyx 5-parted; corolla-tube almost none, flat or concave, 2-lipped, upper lip 2-lobed, lower 3-lobed, all lobes flat and broad, lower lip 2-spurred; stamens 4; style filiform: caps. subglobose or elongated, septicidally dehiscent; seeds numerous. (Dias-cia: probably from Greek to *adorn*, referring to the attractive fls.)

**D. Barberæ**, Hook. f. Annual, erect, about 1 ft. high: lvs. ovate, petioled or upper ones sessile: fls. in terminal racemes, slender-pedicelled, rosy-pink with yellow spot on throat; lower lobe of corolla much larger than others, the spurs about as long as lower lobe; anthers yellow. (Bears the name of Mrs. Barber who sent seeds from S. Afr.)

**24. ALONSOA**, Ruiz & Pav. Herbs or shrubs from trop. Amer., of 10 or more species, grown in flower-gardens.—Glabrous except infl.: lvs. opposite or whorled in 3's, entire or serrate: fls. red, in terminal racemes; calyx 5-parted; corolla turned upside down by torsion of pedicel, bringing the lower lobe uppermost, flat-rotate, tube almost none; stamens 4, with short filaments: caps. ovate or oblong, obtuse, septicidally 2-valved; seeds numerous, small. (Alonso-a: for Alonzo Zanoni, Spanish official at Bogota.)

Lvs. linear, pointed, entire or finely toothed.....1. *A. linearis*

Lvs. ovate- or broad-lanceolate.

Anthers much longer than filaments.....2. *A. acutifolia*

Anthers much shorter than filaments.

Style twice as long as filaments.....3. *A. incisifolia*

Style about as long as filaments.....4. *A. Warscewiczii*

1. **A. linearis**, Ruiz & Pav. Plant bushy and much branched, 1-1½ ft. high, very floriferous: lvs. linear, pointed, entire or finely toothed, often crowded: fls. scarlet; anthers longer than filaments. Peru.—There is a smaller form.

2. **A. acutifolia**, Ruiz & Pav. (*A. myrtifolia*, Roehl). Plant bushy, 2-3 ft. high: lvs. broad-lanceolate, sharply simple-toothed: fls. cinnabar-red (white in a var.), borne in elongated leafy racemes; upper lip three or four times longer than calyx; anthers much longer than filaments. Peru.

3. **A. incisifolia**, Ruiz & Pav. From 1-2 ft. high, erect: lvs. oval to ovate-lanceolate, deeply cut-toothed: fls. scarlet, purple-black in throat, in simple loose racemes; upper lip two to four times longer than calyx; anthers two to three times shorter than filaments; style twice as long as filaments. Peru.

4. **A. Warscewiczii**, Regel (*A. grandiflora*, Hort. *A. compacta*, Hort.). To 3 ft. high, very bushy, erect: lvs. ovate-lanceolate, somewhat cordate at base, simple or double-toothed, bright green above, paler beneath: fls. cinnabar- or scarlet-red, in loose racemes at ends of branches; upper lip four to five times longer than calyx; anthers three to four times shorter than curved filaments; style (with stigma) about as long as filaments. (Named for J. von Warscewicz, Polish collector, died 1866; page 206.) Peru.—Runs into cultivars. Probably *A. Mutisii* of the trade belongs here.



25. **ANGELONIA**, Humb. & Bonpl. About 24 species of herbs or subshrubs native in trop. Amer., especially Brazil, 1 species in Mex. and W. Indies, grown in greenhouses in the N.—Lvs. opposite or upper ones alternate: fls. blue, solitary in the axils or in terminal racemes; calyx 5-parted or 5-toothed; corollatube almost none, upper lip 2-lobed, lower 3-lobed; throat ventricose, with a 2-toothed protuberance at lower end; stamens 4, with short filaments: caps. globose or elliptical, 2-valved, loculicidally dehiscent, rarely indehiscent. (Angelo-nia: from *angelon*, S. American name of one of the species.)

**A. grandiflora**, C. Morr. Perennial, to 2 ft.: lvs. entire or slightly toothed, lance-pointed: fls. solitary, not exceeding the lvs., lilac (white in var. *alba*), fragrant, lobes prominent and spreading. S. Amer.

26. **CALCEOLARIA**, L. (*Fagelia*, Schwencke). SLIPPERWORT. Some 200 herbs and shrubby plants, a few of which are cult. for the odd and showy saccate fls.; nearly all are native from Mex. to the Andes of Peru and Chile.—Lvs. opposite or verticillate, simple or pinnate: fls. bisexual, in irregular cymes, mostly yellow, sometimes purple, often oddly spotted; calyx 4-parted; corolla strongly irregular, 2-parted, the upper lip small and ascending and usually more or less saccate, under which are borne the essential organs, the lower lip in the cult. kinds very large and inflated and more or less slipper-like (whence the name *calceolus*, Latin "slipper"); stamens 2; style short, the stigma entire or only obscurely 2-lobed: fr. a septicidal caps. splitting at the top; seeds many and minute.—The usual cult. calceolarias are broadly referable to three groups.

Lvs. pinnatisect or pinnate.....1. *C. scabiosæfolia*  
Lvs. not lobed.

Plant herbaceous: lvs. very large and soft, ovate.....2. *C. crenatiflora*  
Plant woody: lvs. small, mostly on the oblong or lanceolate order...3. *C. integrifolia*

1. **C. scabiosæfolia**, Roem. & Schult. Annual pilose herb, 1-2 ft., branching: lvs. variously pinnatisect or pinnate, 5-8 in. long, the bases of petioles connate across the st. by membrane or projecting ridge; lfts. or segms. 2-3 pairs, ovate to broad-lanceolate, dentate or pinnatifid: fls. many, small,  $\frac{1}{2}$  in. across more or less, pale yellow, the slipper usually obovate; summer. Ecuador to Chile; infrequently grown.—**C. chelidonioides**, HBK., with which this species may be confused and which is to be looked for in cult., is sparsely hairy only above, and the petioles not connate, fls. larger.

2. **C. crenatiflora**, Cav. Stout branchy herbaceous plant 1-2½ ft. high, soft-hairy: lvs. simple, large and soft, ovate to broad-ovate, obtuse or with only a short bluntish point, sinuate or dentate, the basal ones petioled and 4-8 in. long, the cauline becoming sessile and successively smaller: fls. hanging on slender pedicels,  $\frac{3}{4}$  in. or more long, yellow and with orange-brown spots on the large much-inflated crenate or fluted lower lip; upper lip not exceeding the broad-ovate green calyx-lobes. Chile; source of the common florists' herbaceous calceolarias in different races; probably some of the current cult. strains are the result of hybridization (*C. herbeohybrida*, Voss), the parentage now being a matter of conjecture.

3. **C. integrifolia**, L. (*C. rugosa*, Ruiz & Pav.). Sts. woody, the plant becoming a subshrub 2-6 ft., more or less branched, the young parts viscid-scurfy or -pubescent, bark brown: lvs. simple, rather firm, oblong or sometimes oval, 1-3 in. long and 1 in. or more broad, rugose, acute or obtuse, narrowed to short petiole, margins crenate-serrate: fls. short-pedicelled, in rather close peduncled clusters, yellow to red-brown, not spotted, the globular or short-oblong lip about  $\frac{1}{2}$  in. across. Chile.—Common under glass and planted out; there are named cultivars, as *C. Lymani* and *C. Stewarti*. Some cult. forms are probably hybrids (*C. fruticohybrida*, Voss) of obscure derivation. Var. **angustifolia**, Lindl. (*C. angustifolia*, Sweet). Lvs. lanceolate and more acute, about  $\frac{1}{2}$  in. or less broad.

### 153. BIGNONIACEÆ. BIGNONIA FAMILY

Trees, shrubs, and woody vines, or rarely herbs, of about 100 genera and 600 species widely distributed in trop. regions, a few extending into the temp. zone.—Lvs. opposite or rarely alternate, simple or compound, exstipulate:



FIG. 13. STRUCTURES BIGNONIACEÆ TO CUCURBITACEÆ.

A, *Campsis radicans*; flower in lengthwise section; stamens and style above. B, *Proboscidea louisiana*, front view of flower above, side view below. C, *Lonicera*, twin flowers and fruits. D, *Lonicera*, another type, showing nectary at base of corolla. E, *Viburnum pubescens*, fruiting spray, fruit cluster; separate fruit and section below. F, *Linnaea*. G, Dehiscent fruit of *Echinocystis lobata*. H, Flower and fruit of *Valeriana*. I, *Curcubita moschata*, staminate flower above and pistillate flower below. J, *Lobelia cardinalis*, and details. K, *Campanula rotundifolia*; cross-section of fruit.

fls. bisexual, more or less irregular, mostly showy, in terminal or axillary panicles or racemes; calyx tubular, truncate or 5-toothed, sometimes spathe-like; corolla gamopetalous, campanulate, funnellform or tubular, 5-lobed, seldom somewhat 2-lipped; fertile stamens commonly 4, inserted on corolla-tube and alternate with its lobes, sometimes 2 or the fifth stamen anther-bearing; hypogynous disk present; ovary superior, 1- or 2-celled, with numerous ovules on parietal placenta; style slender, with 2-lobed stigma: fr. a loculicidally or septifragally (valves breaking away from dissepiments) dehiscent caps.; seeds compressed, usually winged.—Aside from the following, species of the genus *Tabebuia*, Gomez, are cult. in the tropics; the genus differs from *Tecoma* chiefly in the simple or digitate lvs. and the ovules in 2 to several series. *A*, Fig. 13.

- A. Habit climbing.
  - B. Ovary 2-celled.
    - C. Climbing by tendrils.
      - D. Plant with 3-parted tendrils.
        - E. Stamens included.
          - F. Caps. not prickly.
            - G. Tendrils not claw-like but clinging by small disks. . . . . 1. BIGNONIA
            - GG. Tendrils claw-like or hooked. . . . . 2. DOXANTHA
          - FF. Caps. densely covered with prickles: tendrils filiform. . . . . 3. PITHECOCTENIUM
        - EE. Stamens slightly exserted.
          - F. Corolla-lobes (in ours) with prominent white velutinous margins. . . . . 4. PYROSTEGIA
          - FF. Corolla-lobes without white margins. . . . . 5. PHEDRANTHUS
      - DD. Plant with simple tendrils. . . . . 6. CLYTOSTOMA
    - C. Climbing but not by tendrils.
      - D. Stamens exserted. . . . . 7. TECOMARIA
      - DD. Stamens included.
        - E. Fls. scarlet or orange: climbing by aerial rootlets. . . . . 8. CAMPSIS
        - EE. Fls. white or pink: climbing without rootlets. . . . . 9. PANDOREA
  - BB. Ovary 1-celled. . . . . 10. ECCREMOCARPUS
- AA. Habit upright.
  - B. Ovary 1-celled: fr. indehiscent. . . . . 11. CRESCENTIA
  - BB. Ovary 2-celled.
    - C. Plant an herb: caps. opening only or more deeply along ventral suture. . . . . 12. INCARVILLEA
    - CC. Plant a shrub or tree: caps. separating into 2 valves.
      - D. Lvs. simple.
        - E. Fertile stamens 2: lvs. ovate. . . . . 13. CATALPA
        - EE. Fertile stamens 4: lvs. linear. . . . . 14. CHILOPSIS
      - DD. Lvs. pinnate.
        - E. Calyx spathe-like, splitting down one side. . . . . 15. SPATHODEA
        - EE. Calyx campanulate.
          - F. Fertile stamens 5. . . . . 16. OROXYLON
          - FF. Fertile stamens 4.
            - G. Staminodia about as long as fertile stamens: fls. blue or violet. . . . . 17. JACARANDA
            - GG. Staminodia short: fls. yellow or scarlet.
              - H. Stamens included. . . . . 18. TECOMA
              - HH. Stamens exserted. . . . . 7. TECOMARIA

1. **BIGNONIA**, L. (*Doxantha*, Auth., not Miers. *Anisostichus*, Bur.). Woody tendril-climbers, desirable because of the profusion and beauty of their fls., grown in the open in warmer parts of the country and also under glass; a single species native to S. E. U. S.—Vines with opposite 2-foliolate lvs., the terminal lft. reduced to a tendril: fls. large, in axillary cymes; calyx campanulate, the limb undulate, truncate or slightly 5-toothed; corolla-tube abruptly much-expanded above the calyx, the limb somewhat 2-lipped, with 5 rounded lobes; stamens 4, paired, included, inserted near base of corolla, the sterile rudiment of a fifth sometimes present: fr. a 2-celled septifragal caps. flattened parallel to the partition, the valves thickened; seeds winged. (Bignonia: the Abbé Jean Paul Bignon, 1662–1743, court librarian to Louis XIV.)—A genus variously understood by the different authorities. The nomenclature in this and associated genera is likely to undergo change.

**B. capreolata**, L. (*B. crucigera*, L., in part. *Anisostichus capreolata*, Bur. *Doxantha capreolata*, Miers). TRUMPET-FLOWER. CROSS-VINE. QUARTER-VINE. Evergreen climber to 50 ft. or more, glabrous: lvs. petioled, ending in a branched tendril that clings by small disks, the 2 lfts. stalked, oblong or ovate, entire, acute or acuminate: cymes many, 2-5-fld., short-peduncled; corolla yellow-red and lighter within, tubular, 2 in. long, with a stout limb: caps. very flat; seeds broadly winged laterally, narrowly winged above and below. Va. to Fla., La., O., and S. Ill.

2. **DOXANTHA**, Miers (*Bignonia*, Auth., not L.). Shrubby climbers grown out-of-doors in the S. for their large showy fls., in greenhouses farther N.; 2 species from the W. Indies and Mex. to S. Brazil and Argentina.—Lvs. opposite, 2-foliolate, with a terminal 3-cleft claw-like tendril, or 3-1-foliolate; lfts. oblong, sometimes toothed: fls. conspicuous, solitary or in short panicles; calyx campanulate, truncate, with irregular or lobed border; corolla campanulate-funnelform, the limb with 5 often unequal lobes; stamens paired, included; ovary almost 4-angled, with numerous seeds in each cell: caps. elongate-linear, with leathery valves; seeds elliptic with membranaceous wings. (Doxan-tha: Greek *glory-flower* in allusion to its beauty.)

**D. Unguis-cati**, Rehd. (*D. Unguis*, Miers. *Bignonia Unguis-cati*, L.). CATS-CLAW (in Latin *Unguis-cati*). Lvs. evergreen, terminated by a 3-parted claw-like tendril; lfts. 1 pair, lanceolate and pointed, cordate, 3 in. or less long: fls. trumpet-shaped, 2 in. long, allamanda-like; corolla-tube clear bright yellow, the throat with orange lines; limb 2-4 in. across, the lobes spreading, the upper surface orange-yellow. Argentina.

3. **PITHECOCTENIUM**, Mart. Evergreen tendril-climbing shrubs, of about 20 species from Mex. to Argentina.—Lvs. opposite, 3-foliolate or the terminal lft. replaced by a filiform 3-parted tendril: fls. in terminal racemes or panicles; calyx leathery and tomentose, campanulate, truncate or with small teeth; corolla campanulate, curved, leathery, the lobes imbricate in bud; stamens included; disk large; ovary warty, with many ovules in several rows: caps. large and broad, densely covered with prickly warts, the persistent septum with enlarged margin. (Pithecocte-nium: Greek *monkey's comb*, referring to the spiny fr.)

**P. cynanchoides**, DC. (*P. clematideum*, Griseb.). Branchlets slightly hairy: lfts. ovate, 1-2 in. long, long-acuminate, subcordate and ciliate at base, glabrous above: fls. white, 1½-2 in. long, pubescent outside, in few-fld. racemes, with funnelform tube and spreading limb: fr. covered with yellowish spines, 2½ in. long. Argentina, Uruguay.

4. **PYROSTEGIA**, Presl. Four species of evergreen climbing shrubs native in S. Amer., cult. in greenhouses and out-of-doors S.—Lvs. of 2-3 lfts. and filiform 3-parted tendrils: fls. in terminal panicles; calyx campanulate or tubular, truncate or toothed; corolla tubular-funnelform, curved, the lobes valvate in bud; stamens exerted; disk annular; ovary linear, the many seeds arranged in 2 rows or zigzag: caps. long-linear, with leathery valves. (Pyroste-gia: Greek for *fire* and *roof*, referring to color of fls. and shape of upper lip.)

**P. venusta**, Baill. (*P. ignea*, Presl. *Bignonia venusta*, Ker). Branchlets striate or somewhat angled: lfts. ovate to ovate-oblong, 2-3 in. long, short or abruptly acuminate, broadly cuneate at base, petioles pubescent: fls. crimson-orange, 2-3 in. long, in many-fld. pendulous panicles; calyx glandular, ciliate; corolla-lobes oblong, obtuse, reflexed, with prominent white velutinous margins. Brazil.

5. **PHÆDRANTHUS**, Miers. One evergreen climbing shrub from Mex., grown in warm countries.—Lvs. compound, of 2 entire lfts. and a 3-parted filiform tendril: fls. in terminal racemes; calyx leathery and tomentose, campanulate, with 5 unequal short teeth; corolla tubular-funnelform, curved, the



lobes imbricate in bud; stamens exserted; disk fleshy; ovary tomentose, with many ovules in several rows. (Phædran-thus: Greek for *gay* and *flower*.)

**P. buccinatorius**, Miers (*Bignonia Cherere*, Lindl. *B. buccinatoria*, Mairét). Branches 4-angled: lfts. elliptic to ovate-oblong, 2-4 in. long, cuspidate or obtuse, glabrous above, tomentose beneath when young, petioles pubescent: fls. blood-red, yellow at base, 4 in. long, pendulous, with spreading emarginate lobes. Mex.

**6. CLYTOSTOMA**, Bur. Climbing evergreen shrubs, of about 8 species in S. Amer.—Lvs. of 2 entire lfts., the terminal lft. usually represented by a simple slender tendrill: fls. in axillary or terminal panicles; calyx campanulate, with 5 subulate teeth; corolla funnelform-campanulate, the rounded lobes imbricated in the bud; stamens included; disk short; ovary warty, the many ovules in 2 rows: caps. broad and prickly. (Clytos-toma: Greek for *splendid* and *mouth*, alluding to the beautiful fls.)

**C. callistegioides**, Bur. & Schum. (*Bignonia speciosa*, Graham). Lfts. elliptic-oblong, 2-3 in. long, acuminate, glabrous and lustrous, undulate: fls. lavender, streaked, 3 in. long; calyx-lobes produced into long linear points; limb of corolla 2-3 in. across, the spreading lobes broadly oval and wavy. S. Brazil, Argentina.

**7. TECOMARIA**, Fenzl. Five species in Cent. and S. Amer. and S. Afr., grown out-of-doors in warm regions for their showy fls.—Half-climbing or nearly upright evergreen shrubs with slender often sarmentose branches: lvs. opposite, odd-pinnate; lfts. serrate: fls. yellow, orange or scarlet, in dense terminal panicles or racemes; calyx campanulate, regularly 5-toothed; corolla funnelform, slightly curved; stamens mostly exserted, with pendulous diverging cells; disk cupulate: caps. linear, compressed. (Tecoma-ria: name derived from Tecoma, alluding to its affinity.)

**T. capensis**, Seem. (*Tecoma capensis*, Lindl.). CAPE-HONEYSUCKLE. Lvs. petioled; lfts. 7-9, broadly oval to ovate,  $\frac{1}{2}$ -2 in. long, acute or acuminate, serrate, glabrous or woolly underneath in the axils of the veins: fls. in peduncled terminal racemes; corolla orange-red to scarlet, about 2 in. long, with 4-parted spreading limb, the upper lip emarginate: caps. linear, 1-2 in. long. S. Afr.

**8. CAMPSIS**, Lour. TRUMPET-CREEPER. Deciduous woody vines; 1 species in N. Amer. and 1 in China and Japan.—Climbing by aerial rootlets: lvs. opposite, odd-pinnate, the lfts. toothed: fls. large, orange or scarlet, in terminal clusters or panicles; calyx tubular-campanulate, leathery, unequally 5-toothed; corolla funnelform-campanulate, enlarged above the calyx, slightly 2-lipped, with 5 spreading lobes; stamens 4, 2 longer and 2 shorter; ovary 2-celled, surrounded at base by a large disk: fr. an elongated caps. loculicidally dehiscent, the 2 valves separating from the septum to which the seeds are attached; seeds numerous, compressed, with 2 large translucent wings. (Camp-sis: Greek *curve*, referring to the curved stamens.)

Lfts. 9-11, pubescent beneath at least along the midrib: calyx-teeth short. . . . 1. *C. radicans*

Lfts. 7-9, glabrous beneath: calyx 5-lobed to the middle. . . . . 2. *C. chinensis*

**1. C. radicans**, Seem. (*Tecoma radicans*, Juss. *Bignonia radicans*, L.). TRUMPET-CREEPER. TRUMPET-VINE. TRUMPET-HONEYSUCKLE. Climbing to 30 ft. or more: lfts. 9-11, oval to ovate-oblong,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, acuminate, serrate, dark green above, pale and pubescent beneath (at least along the midrib): fls. usually orange with scarlet limb, about 3 in. long; corolla-tube almost three times as long as the short-toothed calyx: caps. cylindric-oblong, 3-5 in. long, keeled along the sutures, stalked, beaked at apex. Summer and early autumn. Pa. and Ill. to Fla. and Tex.—There are vars. with deep scarlet, orange-red, and yellow fls.

**2. C. chinensis**, Voss (*C. adrepens*, Lour. *Tecoma grandiflora*, Delaun. *T. chinensis*, C. Koch. *Bignonia chinensis*, Lam.). CHINESE TRUMPET-CREEPER. Aërial rootlets few or none: lfts. usually 7-9, ovate to ovate-lanceolate,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, serrate, glabrous beneath: fls. scarlet, the corolla shorter and broader than in the preceding species, about 2 in. across; calyx 5-lobed to the middle, one-half to about as long as the corolla-tube: caps. obtuse at apex. Summer and early

autumn. China, Japan.—A var. has bright scarlet fls. with short corolla-tube and reflexed lobes.

9. **PANDOREA**, Spach. Five species of ornamental woody vines from Australia to Malay Archipelago and in S. Afr.; formerly usually included under *Tecoma*.—Climbing without tendrils or roots: lvs. evergreen, opposite, odd-pinnate; lfts. entire or serrate: fls. white or pink, in axillary or terminal few- or many-fl'd. panicles; calyx small, campanulate, 5-toothed; corolla funnelform-campanulate, with imbricate lobes; stamens included; disk thick, ring-like; ovary linear, the seeds in many series: pod oblong, with thick valves not keeled; seeds broadly elliptic, winged. (*Pando-rea*: Pandora, Greek mythological name.)

Fls. white: lfts. 3-9.

Panicles many-fl'd.; corolla  $\frac{3}{4}$  in. long. . . . . 1. *P. australis*

Panicles rather few-fl'd.; corolla  $1\frac{1}{2}$ -2 in. long. . . . . 2. *P. jasminoides*

Fls. pink: lfts. 7-11. . . . . 3. *P. Ricasoliana*

1. *P. australis*, Spach (*Bignonia Pandoræ*, Sims. *Tecoma australis*, R. Br.). **WONGA-WONGA VINE**. High climbing: lfts. 3-9, elliptic-ovate to ovate-lanceolate,  $1-2\frac{1}{2}$  in. long, acuminate but bluntly pointed, entire or sometimes coarsely crenate, glabrous, shining above: fls.  $\frac{3}{4}$  in. long, yellowish-white, the throat spotted violet, in many-fl'd. panicles; corolla-limb spreading, 5-lobed: fr. oblong, 2-3 in. long, pointed. Australia.—A var. has light rose-colored fls. and in young plants very finely cut lvs.

2. *P. jasminoides*, Schumann (*Tecoma jasminoides*, Lindl. *Bignonia jasminoides*, Hort.). **BOWER PLANT** of Australia. Lfts. 5-9, almost sessile, ovate to lanceolate, 1-2 in. long, acuminate but bluntly pointed, entire, glabrous: fls. white, sometimes suffused with pink, usually rosy-pink in the throat,  $1\frac{1}{2}$ -2 in. long, in few-fl'd. panicles; corolla-limb large and spreading, with crenate lobes. Australia.—A var. has larger white fls.

3. *P. Ricasoliana*, Baill. (*Tecoma Mackenii*, W. Wats. *Tecoma Ricasoliana*, Tanfani). Lfts. 7-11, short-petioled, elliptic-ovate, about 1 in. long, acute or acuminate, serrate, glabrous, dark green above and pale beneath: fls. 2 in. long, light pink striped with red, in loose terminal panicles; corolla with spreading 5-lobed limb, glabrous: fr. linear, terete, 10-12 in. long. (Presumably named from the gardens of Baron Ricasoli, Italy.) S. Afr.

10. **ECCREMOCARPUS**, Ruiz & Pav. Tendril-climbers grown for their showy fls.; 3 or 4 species from Peru and Chile.—Tall-climbing shrubs grown as annuals in the N.: lvs. opposite, 2-parted or -pinnate, terminated by a branching tendril: fls. more or less irregular, yellow, scarlet, or orange, mostly racemose; calyx campanulate, 5-parted; corolla-tube elongate, the limb more or less 2-lipped or small and nearly entire; stamens 4, didynamous, included; disk annular: fr. an ovate or elliptic loculicidal 1-celled caps. (*Eccremocar-pus*: Greek *pendent fruit*.)

**E. scaber**, Ruiz & Pav. Perennial about 10 ft. high, blooming from seed the first year: lvs. bipinnate; lfts. ovate-lanceolate, obliquely cordate, entire or serrate, obtuse or acute: fls. 1 in. long, orange, in racemes; corolla-tube narrow at base, the upper half gibbous and constricted just below the narrow limb which has 5 short rounded lobes. Chile.—There are vars. with scarlet, golden-yellow, and carmine-red fls.

11. **CRESCENTIA**, L. About 5 species in Mex. and Cent. Amer., one yielding the calabash fr. which is used for water-gourds.—High or low trees, glabrous: lvs. alternate, solitary or clustered at the nodes, simple or ternately compound: fls. yellowish with red or purple veins, large; calyx 2-parted or deeply 5-cut; corolla tubular, with a fluted 5-cut limb: fr. a hard-rinded berry with many seeds surrounded by a pulp. (*Crescen-tia*: after Crescenzi, 13th century Italian agricultural writer.)

**C. Cujete**, L. **CALABASH-TREE**. Tree 20-40 ft. high, readily distinguished by its peculiar habit of growth, as it bears large wide-spreading horizontal scarcely divided

branches with clusters of lvs. at intervals: lvs. broadly oblanceolate, 4-6 in. long, tapering to base, dark glossy green: fls. solitary, pendulous; calyx 2-parted; corolla constricted below the middle, swollen above, malodorous when decaying; stamens 4, sometimes 5: fr. frequently 18-20 in. through. (Cujete: Brazilian name.) Trop. Amer., especially familiar in the W. Indies.

12. **INCARVILLEA**, Juss. Herbs suitable for border planting; species about a dozen, Turkestan, Tibet, China.—St. simple or somewhat branched, glabrous: lvs. alternate, simple or 2-3-pinnate, with narrow segms.: fls. large, red or yellow, in terminal clusters; calyx campanulate, 5-lobed; corolla-tube elongate, enlarging outward, limb somewhat 2-lipped, the 5 lobes broad and spreading; stamens 4, didynamous, included; disk ring-like; ovary 2-celled: fr. a caps. with many winged seeds. (Incarvil-lea: after Incarville, the French Jesuit missionary to China, correspondent of Jussieu in 1743.)

Lf-segms. toothed or crenate: fls. rose-purple with yellow tube.....1. *I. Delavayi*  
Lf-segms. parted or dissected: fls. pink.....2. *I. variabilis*

1. **I. Delavayi**, Bur. & Franch. Lvs. few, radical, 1 ft. long, pinnately compound; lfts. 15-20, dentate, 4-5 in. long, not quite opposite: peduncle 1-2 ft. high, bearing 2-12 large trumpet-shaped fls. 2-3 in. long and as wide; corolla rose-purple with yellow tube, the 2 upper lobes of the limb smaller than the 3 lower. (Named for the Abbé Delavay, who collected in China.) China.

2. **I. variabilis**, Batalin. Bushy subshrub, the seedlings blooming the first year: lvs. 2-3-pinnate; segms. parted or dissected, their lobes entire or slightly lobed: fls. as many as 10, pale rose, 1 in. or more across, blooming from late spring to autumn. China.

13. **CATALPA**, Scop. Trees, frequently planted for ornament and also in timber plantations; about 10 species in N. Amer., W. India, and E. Asia.—Deciduous or rarely evergreen: lvs. opposite or sometimes whorled, long-petioled, large and simple, entire or coarsely lobed, emitting in most species a disagreeable odor when bruised: fls. white, pinkish, or yellowish, in large showy terminal panicles; calyx splitting irregularly or 2-lipped; corolla campanulate, 2-lipped, with 2 smaller upper and 3 larger lower lobes; fertile stamens 2, curved, with diverging anther-sacs, not exserted; style 2-lobed at apex, slightly longer than the stamens: fr. a very long cylindric caps. separating into 2 valves, with numerous small oblong compressed seeds bearing a tuft of white hairs at each end. (Catal-pa: Indian name for *C. bignonioides*.)

Fls. yellow, inside striped orange and spotted dark violet, less than 1 in. long.....1. *C. ovata*

Fls. white, with 2 yellow stripes inside, and spotted purplish-brown, 1½-2 in. long.

Lvs. abruptly acuminate.

Diam. of fls. about 2 in.....2. *C. bignonioides*

Diam. of fls. less than 2 in.....3. *C. hybrida*

Lvs. long-acuminate: diam. of fls. about 2½ in.....4. *C. speciosa*

1. **C. ovata**, Don (*C. Kämpferi*, Sieb. & Zucc. *C. Henryi*, Dode). Tree to 20-30 ft., with spreading head: lvs. broadly cordate-ovate, 5-8 in. long, abruptly acuminate, often 3-5-lobed and each lobe slender-pointed, finely pubescent with simple hairs or at length nearly glabrous, with reddish spots in the axils of the veins beneath: panicles many-fl., 4-7 in. long, fragrant; fls. yellow, not 1 in. long, inside striped orange and spotted dark violet: pod 12 in. long, ½ in. diam. China; much cult. in Japan.

2. **C. bignonioides**, Walt. (*C. Catalpa*, Karst. *C. syringifolia*, Sims). **CATALPA. INDIAN-BEAN.** Tree 20-50 ft., with round spreading head: lvs. often whorled, broadly cordate-ovate, 5-8 in. long, abruptly acuminate, sometimes with 2 small lateral lobes, pubescent beneath, with an unpleasant odor: panicles broadly pyramidal, 8-10 in. long, many-fl.; fls. about 2 in. diam., white with 2 yellow stripes inside and thickly spotted purplish-brown: fr. slender, terete, 6-15 in. long. Southern states north to Tenn.—Pods, seeds, and bark said to possess medicinal properties. There is a yellow-leaved var. and one forming a dense broad bush.

3. *C. hybrida*, Spaeth (*C. bignonioides* × *C. ovata*. *C. Teasi*, Penhall. *C. Teasiana*, Dode). HYBRID CATALPA. Large tree intermediate between the parents: lvs. resembling more those of *C. ovata* but much larger, pubescent beneath, purplish when unfolding: fls. resembling those of *C. bignonioides* but smaller and the infl. often twice as long. Originated at J. C. Teas' nursery at Baysville, Ind.

4. *C. speciosa*, Warder (*C. cordifolia*, Jaume, partly). WESTERN CATALPA. To 100 ft. high: lvs. inodorous, cordate-ovate, 5–12 in. long, long-acuminate, downy beneath: panicles comparatively few-fl'd., about 6 in. long and rather wider; fls. white, 2–2½ in. diam., inconspicuously spotted inside, the lobes spreading and frilled at the margin: pod 8–18 in. long, ½–¾ in. thick. S. Ill. and Ind. to La. and Miss.—A var. has lvs. freely dotted with white or cream-color.

14. **CHILOPSIS**, Don. A single deciduous shrub or low tree native to S. W. U. S. and Mex., planted for its attractive bloom.—Lvs. narrow, often not opposite: corolla more trumpet-shaped than in *Catalpa*, the lobes jagged; anther-bearing stamens 4, a fifth rudimentary; ovary 2-celled: fr. cylindric, many-seeded. (*Chilop-sis*: Greek *lip-like*.)

*C. linearis*, DC. (*C. saligna*, Don). DESERT-WILLOW. FLOWERING-WILLOW. MIMBRES. Height 10–20 ft.: branches slender, leafy: lvs. narrow-lanceolate or linear: fls. bignonia-like, in a short terminal raceme; corolla 1–2 in. long, 5-lobed and crimped, the tube and throat lilac, with 2 yellow stripes inside. Dry districts from S. Tex. to Calif. and in Mex.—There is a white-fl'd. form.

15. **SPATHODEA**, Beauv. Handsome evergreen trees with large showy fls., grown out-of-doors in trop. and sub trop. regions or rarely in greenhouses; 2 or 3 species native of trop. Afr.—Lvs. large, opposite, odd-pinnate or sometimes ternate, with entire lfts.: fls. orange-red or scarlet, in terminal panicles or racemes; calyx split on one side and recurved, exposing the corolla to base; corolla broadly campanulate and ventricose; stamens 4, exserted, with spreading pendulous anther-cells; disk large, cup-shaped; ovary oblong, 2-celled, the ovules in several rows: caps. oblong-lanceolate, acuminate at both ends, loculicidal with woody valves; seeds elliptic, broadly winged. (*Spatho-dea*: Greek *spathe-like*, referring to the shape of the calyx.)

*S. campanulata*, Beauv. To 70 ft. high: lvs. 1–1½ ft. long; lfts. 9–19, short-stalked, ovate-lanceolate or elliptic, 2–4 in. long, abruptly short-acuminate, with 2–3 fleshy glands at base, glabrous or somewhat pubescent beneath when young: fls. scarlet, about 4 in. long, in many-fl'd. racemes or panicles; calyx leathery, boat-shaped, 2½ in. long; corolla-lobes ovate, plicate, somewhat undulate: caps. flattened, 8 in. long, 2 in. through, glabrous. Trop. Afr.—A showy tree in the American tropics (where it is sometimes called "Santo Domingo Mahogany"), and somewhat planted within our limits.

16. **OROXYLON**, Vent. Also written *Oroxylum*. An ornamental tree from S. Asia, cult. out-of-doors in the S.—Lvs. large, opposite, 2–3-pinnate: fls. in terminal panicles; calyx leathery, campanulate, truncate or shortly toothed; corolla campanulate, white or purplish, with 5 crisped and toothed lobes; stamens 5, slightly exserted; disk large, fleshy; ovary 2-celled: fr. linear, septicidally dehiscent; seeds broadly elliptic, compressed, with a broad transparent wing. (*Orox-ylum*: Greek *a mountain tree*: nevertheless it grows anywhere from sea-level to an altitude of 3,000 ft.)

*O. indicum*, Vent. (*Calosanthès indica*, Blume). To 40 ft. high: lvs. glossy, 2–4 ft. across; lfts. ovate, about 5 in. long, entire, glabrous: racemes peduncled, to 10 in. long; fls. 2½ in. long and 2–3½ in. across: caps. 1–3 ft. long, 2–3 in. wide, compressed. India to Cochin-China and Malaya.

17. **JACARANDA**, Juss. Trees and shrubs grown out-of-doors far S. and also under glass for the attractive finely cut foliage and showy tubular fls.; species about 50 in the American tropics.—Lvs. opposite, 2- or rarely 1-pinnate; lfts. usually numerous, entire or dentate: fls. blue or violet, mostly in terminal



or axillary panicles; calyx small, truncate or 5-toothed; corolla-tube straight or curved, the limb somewhat 2-lipped, with 5 rounded spreading nearly equal lobes; disk thick and cushion-like; perfect stamens 4, didynamous, staminode about as long as the stamens, club-shaped and often bearded at the top; ovary 2-celled: fr. an oblong, ovate or broad dehiscent caps. (Jacaranda: Brazilian name.)

Lvs. pubescent: fls. 2 in. long.....1. *J. ovalifolia*  
Lvs. glabrous: fls. 1½ in. long.....2. *J. cuspidifolia*

1. *J. ovalifolia*, R. Br. (*J. mimosifolia*, D. Don). Tree 50 ft. or more high, deciduous only in early spring, with foliage finely cut and fern-like: lvs. distant, each with 16 or more pairs of pinnae, each pinna having 14–24 pairs of oblong cuspidate pubescent pinnules, the terminal one long-acuminate: fls. blue, more or less horizontal, 2 in. long, 1½ in. wide; many, in loose pyramidal panicles 8 in. high; corolla-tube long, bent, swollen above, the 2 lobes of one lip smaller than the 3 other lobes. Brazil.

2. *J. cuspidifolia*, Mart. Lvs. glabrous, with 8–10 pairs of lfts., these again divided into 10–15 lanceolate cuspidate pinnules, the secondary rachis winged: fls. in a large terminal thyrse, blue-violet, the corolla nearly 1½ in. long. Brazil, Argentina.

18. **TECOMA**, Juss. About 80 shrubby species from Fla. and Tex. to Argentina, grown for their showy fls.—Upright plants with herbaceous shoots and dense deciduous or subsistent foliage: lvs. opposite, odd-pinnate or rarely simple; lfts. serrate: fls. large, fragrant, usually yellow, in terminal panicles or racemes; calyx campanulate, truncate or toothed or irregularly 5-lobed; corolla funnelform or funnelform-campanulate; stamens included, with diverging anther-cells and enlarged foliaceous connective; disk cupulate, crenate: caps. linear, with leathery valves; seeds narrow-elliptic, with 2 large thin wings. (Tecoma: abridged from the Mexican name Tecomaxochitl.)

Fls. pure yellow, funnelform-campanulate, abruptly contracted toward base: lfts. 5–11, acuminate.....1. *T. stans*

Fls. yellow and red, tubular-funnelform, gradually narrowed toward base: lfts. 11–17, obtuse or acutish.....2. *T. Smithii*

1. *T. stans*, Juss. (*Stenolobium stans*, Seem.). YELLOW-ELDER. Erect, branching, 1–4½ ft. high: foliage glabrous or minutely pubescent; lvs. 4–8 in. long; lfts. 5–11, oblong-ovate to lanceolate, 1½–4 in. long, acuminate, sharply serrate, sessile or nearly so: fls. in large terminal racemes or panicles; calyx 5-toothed; corolla yellow, 1½ in. long, funnelform-campanulate, abruptly contracted toward base, the limb with undulate lobes; anthers pubescent: caps. linear, 5–7 in. long. Autumn and early winter. S. Fla. to W. Indies and S. Amer.—A var. has 7–11 lfts. sharply serrate with flaring teeth.

2. *T. Smithii*, W. Wats. Supposed hybrid of *T. mollis* and *Tecomaria capensis*: lfts. 11–17, oblong, 1–2 in. long, obtuse or acutish, serrate: fls. in large compound panicles sometimes 8 in. long and as broad; corolla bright yellow tinged with orange, 1½–2 in. long, tubular-funnelform, with 5 reflexed rounded lobes. Blooming in the greenhouse in winter. Australia, where it was raised by Edwin Smith.

#### 154. PEDALIACEÆ. PEDALIUM FAMILY

Herbs or rarely shrubs of trop. and sub trop. regions of Afr., Asia, Australia, and E. Indies; genera 14 and species about 50.—Herbage covered with peculiar slime-secreting glands: lvs. opposite or the upper alternate: fls. bisexual, irregular; calyx 5-cleft; corolla gamopetalous, the tube more or less curved, the limb 5-lobed, indistinctly if at all 2-lipped; stamens 4, didynamous, often with an entire staminode, subepipetalous; disk present, irregular; ovary superior or rarely inferior, 2–4-celled or falsely 1-celled: fr. a caps. or a hard indehiscent structure often covered with stiff hooked spines or wings.—Closely related to the Scrophulariaceæ and Martyniaceæ.

**SESAMUM**, L. Erect or prostrate herbs, suitable for the warmhouse or in the S. growing in the open; about 20 species of trop. and S. Afr. and E. Asia, one cult. for its seeds, sold under the name "bene" and yielding an oil which has various commercial uses.—Herbage scabrous or rarely glabrous: lowest lvs. opposite, the others alternate, all petioled and entire or toothed or incised: fls. pale or violet, solitary in the axils; corolla-limb 2-lipped and 5-lobed; stamens included; ovary 2-celled: caps. oblong or ovoid. (Ses-amum: Greek name taken by Hippocrates from the Arabic.)

**S. orientale**, L. (*S. indicum*, L.). **SESAME**. Height 1–2 ft.: lvs. oblong or lanceolate, 3–5 in. long, the lower often 3-lobed or -parted: corolla pale rose or white, 1 in. long, the 2 lobes of the upper lip shorter than the 3 lobes of the lower. July. Tropics.

### 155. MARTYNIACEÆ. MARTYNIA FAMILY

Glandular-hairy herbs inhabiting trop. and subtrop. Amer., one species reaching S. Ind.; about 3 genera and 10 species.—Annual or perennial, with lvs. opposite or alternate: fls. bisexual, irregular; calyx 5-cleft; corolla gamopetalous, 5-lobed; stamens 4, didynamous, or rarely 2 and the others staminodial, inserted on the corolla and alternating with its lobes; disk present, regular; ovary superior, of 2 carpels but 1-celled; ovules several: fr. a more or less long curved beaked caps. with fleshy pericarp, becoming falsely 4-celled.—Closely related to the Pedaliaceæ but distinguished by the horned fr., 1-celled ovary, parietal placenta, and less slimy pubescence. *B*, Fig. 13, page 684.

**PROBOSCIDEA**, Moench. Rank branchy plants sometimes grown for their odd showy fls., abundant foliage and peculiar pods; the young tender pods are used for pickles the same as cucumbers; a half-dozen species, U. S. to S. Amer.—Coarse annuals or perennials, viscid-pubescent, mostly partially prostrate: lvs. large, hairy, long-petioled: fls. large, yellowish-purple, in axillary few-fl. racemes; calyx-lobes 4–5, more or less unequal; corolla campanulate to broad-funnelform, obscurely 2-lipped; stamens 2 or 4: fr. a curved beaked caps. becoming hard and woody, the beak splitting and forming 2 large opposed hook-like appendages when dry; seeds irregularly angled or flattened. (Proboscid-ea: Greek *snout*, in allusion to the long-horned fr.)

**P. louisiana**, Woot. & Stand. (*Martynia louisiana*, Mill. *M. proboscidea*, Glox. *P. Jussieui*, Steud.). **UNICORN-PLANT**. **PROBOSCIS-FLOWER**. Densely clammy-pubescent annual, low and wide-spreading, with thick opposite divaricate branches: lvs. alternate or subopposite, soft and thick, round-ovate to oblong-ovate, cordate and often unequal at base, wavy-margined, obtuse: racemes becoming central in the forks; fls. square-ended in bud; calyx bracteolate, unequally 5-lobed, slit to base on the lower side; corolla light violet to purple, 1¾ in. long, the limb unequally 5-lobed; stamens 4, in 2 pairs joined by their 2-celled anthers: fr. hanging, the thick body 3 in. long, the curved beak of equal or greater length. Ind. to N. Mex.—The trade names under Proboscidea as well as those of Martynia and of Cranio-laria refer to this species which is the only one of the family in general cult.

### 156. GESNERIACEÆ. GESNERIA FAMILY

Herbs or rarely shrubs or small trees, widely distributed in the tropics of both hemispheres; 84 genera and about 500 species, a number cult. in N. Amer. for ornamental purposes on account of their very large showy fls.—Herbaceous forms with sts. rhizomatous, tuberous, or prostrate, the woody forms erect or climbing: lvs. opposite or sometimes alternate or whorled, simple: fls. bisexual; calyx tubular, 5-toothed or -parted; corolla commonly 5-merous, the tube mostly elongate, the limb of usually unequal segms., often 2-lipped; stamens epipetalous, usually 4 and didynamous, rarely 5, or 2 and the sterile present as staminodes; hypogynous disk present; ovary superior or inferior,

of 2 carpels, 1-celled or falsely 2–4-celled; ovules numerous; style 1; stigmas 1–2: fr. fleshy with pulpy placenta, or capsular or silique-like with twisted valves.

- A. Ovary more or less inferior: fr. capsular.
  - B. Disk of 5 distinct or slightly united equal or unequal glands.
    - c. Caps. shortly immersed at base, almost superior..... 1. CORYTHOLOMA
    - cc. Caps. inferior to the middle or higher.
      - d. Anther-cells distinct..... 2. ISOLOMA
      - dd. Anther-cells confluent at apex..... 3. SINNINGIA
  - BB. Disk annular.
    - c. Fls. axillary..... 4. ACHIMENES
    - cc. Fls. alternate in a terminal leafless raceme..... 5. NÆGELIA
- AA. Ovary wholly superior: fr. capsular or berry-like.
  - B. Perfect stamens 4; anther-cells distinct and parallel.
    - c. Disk with a large posterior gland, otherwise small or wanting.
      - d. Filaments distinct..... 6. EPISCIA
      - dd. Filaments connate into a sheath which is split on the posterior side..... 7. ALLOPLECTUS
    - cc. Disk annular, elevated, almost cup-shaped..... 8. TRICHOSPORUM
  - BB. Perfect stamens 2; anther-cells divaricate or diverging, rarely sub-parallel, confluent at apex.
    - c. Corolla-tube long..... 9. STREPTOCARPUS
    - cc. Corolla-tube short..... 10. SAINTPAULIA

1. **CORYTHOLOMA**, Decne. (*Gesneria*, Mart., in part). Low herbs grown in the greenhouse; species about 50, in the American tropics.—Often tuberous-rooted: lvs. opposite or in 3's: fls. usually red or variegated, pedicelled, solitary or fascicled in the axils, or the upper in a terminal bracteate raceme; calyx campanulate, 5-cleft, the lobes subequal; corolla-tube usually long and ventricose, often curved, the limb oblique or 2-lipped; stamens inserted at base of corolla, little or not at all exerted; disk of 5 glands, the 2 posterior large and more or less united; ovary inferior only at base: caps. almost entirely superior, 2- or rarely 4-valved. (*Corytholoma*: Greek for *helmet* and *throat* or *opening*, referring to the shape of the fls.)

**C. cardinalis**, Fritsch (*Gesneria cardinalis*, Lehm. *G. macrantha*, Hort. *Dircæa cardinalis*, Regel). St. stout, hairy, to 1 ft. high: lvs. cordate-ovate, 4–6 in. long, crenate-dentate, petioled or the upper sessile: fls. 1–4 in the upper axils or crowded in a terminal more or less flat cluster; calyx-lobes lanceolate, erect, recurved at apex; corolla red, hairy, 2½–3 in. long, the tube curved, the limb very oblique with upper lip projecting and lower one almost wanting; anthers united in a disk. Nativity unknown.

2. **ISOLOMA**, Benth. Species perhaps 50, in trop. Amer., suitable for greenhouse cult.—Herbs with creeping roots or rhizome or sometimes more or less woody: lvs. opposite, often villous: fls. scarlet, orange, or vari-colored, solitary or clustered in the axils or in a leafy terminal raceme; calyx obtusely 5-lobed; corolla-tube cylindric, ventricose or enlarged above, erect or more or less declined or incurved; corolla-limb short, with 5 subequal lobes; disk of 5 distinct glands; stamens inserted near the base of the corolla-tube, the anthers with distinct cells: caps. inferior to above the middle. (*Isoloma*: *equal border* or *throat*).—Most of the forms in cult. are probably of hybrid origin, the two species here described most nearly representing them, although other species may be grown.

Calyx-segms. triangular; corolla more than three times as long as calyx..... 1. *I. amabile*

Calyx-segms. linear-lanceolate; corolla three times as long as calyx..... 2. *I. hirsuta*

1. **I. amabile**, Mott. (*Tyldæa amabilis*, Planch. & Lind.). Hairy, 1–2 or more ft. high, with erect st.: lvs. petioled, ovate, bluntly dentate-serrate, acute or acuminate, dull green blotched and reticulated with purple along the main veins: fls. pendent; calyx green, the limb oblique, of 5 spreading triangular segms.; corolla-tube long, slightly curved, swollen, pale within and purple-blotched, the limb dark rose dotted with purple; fifth stamen rudimentary. Colombia.

2. **I. hirsuta**, Regel (not *I. hirsuta*, Hort., which is probably a hybrid). Erect branching shrub, hairy, 4 ft. high: lvs. short-petioled, oblong-ovate, acuminate,

rounded at base, crenate-serrate: fls. nodding, nearly 1 in. long, solitary, on axillary paired lf.-stalks; calyx 5-cleft into equal linear-lanceolate segms.; corolla three times as long as the calyx, the tube incurved, ventricose above, hairy outside, purple with spotted 5-cleft limb; stamens 4, inserted at the base of the corolla, included; anthers coherent, not confluent. W. Indies.

3. **SINNINGIA**, Nees. Trop. herbs suitable for glasshouse cult., including the florists' gloxinia; species 20–25, Brazil.—Low herbs or sometimes almost woody, pubescent or villous, with simple or branching st. from a tuberous rhizome, or sometimes almost stemless: lvs. opposite, usually large, long-petioled, the upper floral ones reduced to bracts: fls. mostly large, solitary or fascicled in the axils, on short or long pedicels; calyx-tube shortly and broadly turbinate, 5-angled or 5-winged, the limb 5-cleft or -parted; corolla-tube subequal at base, gibbous posteriorly, elongate, broadly cylindric, or widened above or campanulate; corolla-limb with 5 broad subequal lobes; stamens inserted at the base of the corolla, included, the anther-cells confluent at apex; glands of the disk 5, distinct or the 2 posterior more crowded together or connate; ovary half inferior: caps. 2-valved above. (Sinningia: for Wilhelm Sinning, gardener at the University of Bonn.)

**S. speciosa**, Benth. & Hook. (*Gloxinia speciosa*, Lodd.). **GLOXINIA**. St. short or not evident: lvs. petiolate, oblong or oblong-ovate, crenate, obtuse or acutish, villous-hairy: peduncles with fls. about the length of the lvs.; fls. large, showy, usually violet or purplish; calyx-lobes ovate-lanceolate, longer than the tube, somewhat villous; corolla broadly campanulate, the limb with 5 short rounded lobes.—This is the cult. gloxinia, other species being little known horticulturally. Variable, giving rise to forms with thick elongated st. and larger lvs., or with white-nerved lvs. or with white or red fls.

4. **ACHIMENES**, P. Br. About 40 herbaceous species, native to trop. Amer., grown under glass.—Simple or branching, mostly villous, with scaly underground rhizomes: lvs. opposite or occasionally whorled, serrate or toothed, sometimes with scaly catkin-like vegetative growths in the axils: fls. solitary or fascicled in the axils; calyx-tube adnate to the ovary, the 5 lobes mostly small, subequal; corolla ranging from red to violet, seldom white, with cylindric declined tube and spreading 5-lobed limb; stamens 4, inserted at the lower part of the corolla-tube, included, the anthers connivent, a staminal node representing the fifth stamen; disk annular, sometimes 5-angled or -lobed; ovary inferior; stigma dilated or 2-lobed: caps. 2-valved. (Achimenes: Greek *to suffer from cold*.)—The garden kinds are much confused by hybridization and it is doubtful whether any of the pure species are in general cult. in this country. The species here described are some of those that have contributed most largely to garden forms.

Fls. solitary in the axils ..... 1. *A. longiflora*  
Fls. usually more than 1 in the axils ..... 2. *A. grandiflora*

1. **A. longiflora**, DC. With root-like filiform rhizomes, producing pear-shaped tubers at their ends: st. 1–2 ft. high, hairy: lvs. opposite or 3–4 in a whorl, oval or ovate-oblong, serrate, narrowed at base, acute or short-acuminate, hairy, pale or somewhat tinted beneath: fls. solitary in the axils; corolla salver-shaped, with long cylindric tube and large widely spreading limb violet-blue above and whitish beneath, the lowest segm. sometimes divided. Guatemala.—A var. has white fls.

2. **A. grandiflora**, DC. Stiffly hairy: lvs. ovate, pointed, unequal at base, irregularly toothed, often reddish beneath: fls. large, numerous, often more than 1 in the axils, bright red-purple; corolla-tube swollen or spurred at base. Mex.

5. **NÆGELIA**, Regel. Herbs grown in the warmhouse for their showy papedal fls., in cult. often called Gesnerias; species about half a dozen in trop. Amer.—Usually rhizomatous or propagating by stolons or offsets and not by tubers: st. subsimple: lvs. opposite, long-petioled, often cordate, soft: fls.



showy, mostly red, sometimes yellowish-white or suffused, alternate in a terminal leafless cluster, the pedicels subtended by small bracts; calyx-tube adnate to the ovary, the limb with 5 subequal lobes; corolla-tube declined, narrow at base, broadening outward, the short limb with 5 rounded slightly unequal lobes; stamens inserted at the base of the corolla-tube, included; disk annular, entire or 5-lobed; ovary half inferior: caps. equally or obliquely 2-valved. (Nægeli-a: Karl von Nægeli, once professor of botany at Munich.)

Fls. scarlet or brick-red with white or yellow markings.

Calyx-lobes spreading: fls. with white markings.....1. *N. cinnabarina*

Calyx-lobes appressed: fls. with yellow markings.....2. *N. zebrina*

Fls. white or cream-color.....3. *N. multiflora*

1. **N. cinnabarina**, Lind. (*Gesneria cinnabarina*, Lind. *Smithiantha cinnabarina*, Kuntze). Winter-blooming, 1½–2 ft. high, soft-hairy: lvs. rotund-ovate, crenate-dentate, thickish, green, with red or purplish hairs: fls. about 1½ in. long, pendent from the ends of the spreading pedicels; calyx-lobes acuminate, spreading; corolla cinnabar-red or nearly scarlet on the upper side, paler and spotted beneath, the tube gibbous to the narrow base. Mex.

2. **N. zebrina**, Regel (*Gesneria zebrina*, Paxt. *Smithiantha zebrina*, Kuntze). To 2 ft. high, densely pubescent, much resembling the preceding: lvs. ovate-subrotund, cordate or reniform, dark purple-red or dark brownish along the nerves on the upper surface: fls. red on the upper side, yellow with dark or red dots within and on the lower side; calyx-lobes short and appressed; corolla 1½ in. long, contracted toward base. Brazil.—The commonest species. Names belonging here are *Gesneria regalis* and *G. splendens*.

3. **N. multiflora**, Hook. (*N. amabilis*, Decne. *Smithiantha amabilis*, Kuntze. *Gesneria amabilis*, Hort.). Erect, 1–1½ ft. high: lower lvs. broadly heart-shaped, petioled, crenate: st.-lvs. ovate-cordate, coarsely toothed, lightly hairy and glandular: fls. white or cream-color, pendulous, the corolla-tube curved and little swollen. Mex.—Much like *N. zebrina*.

6. **EPISCIA**, Mart. Perhaps 30 species of trop. American plants, one much prized for hanging-baskets in the warmhouse.—Pubescent, villous or rarely glabrous herbs: st. simple or branching, from a creeping root: lvs. opposite, of equal or unequal size: fls. scarlet or rarely whitish or purplish, solitary or fascicled, on axillary pedicels, or several on a common peduncle; calyx-limb 5-lobed or -parted; corolla-tube straight or curved, often spurred or swollen at base, the limb oblique or subequal, with 5 rounded lobes; stamens 4, distinct, inserted near the base of the corolla-tube, the anther-cells distinct and parallel, a staminode representing the fifth stamen; disk with a large posterior gland, otherwise small or wanting; ovary superior: fr. dehiscing by 2 coriaceous valves. (Epis-cia: Greek *shady*, growing wild in shady places.)

**E. cupreata**, Hanst. (*Achimenes cupreata*, Hook.). Sts. slender, branched, rooting at the nodes, drooping, the main branch rising erect for a few in. and bearing the fls. and the largest lvs.: lvs. elliptic, oval or rotund-oval, blunt, crenate, rough-hairy, rugose above, often reddish-tinged or copper-colored: fls. scarlet, solitary, ¾ in. wide, the tube with a small sac, the limb denticulate. Nicaragua.—Growing throughout the year. A var. has green foliage and fls. 1 in. across.

7. **ALLOPLECTUS**, Mart. (*Crantzia*, Scop.). Evergreen plants of the tropics, about 35 species, a few grown in the warmhouse for their colored foliage and tubular fls.—Shrubs or half-shrubs, often with climbing sts. rooting at the nodes: lvs. opposite, those of a single pair usually subequal: fls. clustered in the axils, seldom solitary, often surrounded by large bracts; calyx with wide often toothed or pinnatifid segms., usually colored; corolla-tube elongate, straight or curved, often saccate at base, the limb with 5 rounded or fringed lobes; stamens 4, inserted near the base of the corolla-tube, the filaments dilated at base and often connate, the anther-cells distinct and parallel; posterior gland of disk large; ovary superior: fr. leathery, finally opening by

2 valves. (Alloplectus: *diversely plaited*, referring to the appearance of the calyx.)

**A. Schlimii**, Planch. & Lindl. More or less pubescent: st. simple, somewhat woody at base: lvs. ovate to ovate-oblong, obtuse or slightly cordate at base, acuminate, crenate-serrate, 3-4 in. long, green above, violet or purple beneath: fls. usually 2 in the axils, on pedicels superposed upon the petiole; calyx red, 5-parted into cordate revolute concave lobes; corolla urceolate, about 1 in. long, yellow below, red above, the limb with 5 short rotund entire lobes. Trop. S. Amer., where it was collected by M. Schlimm.

**8. TRICHOSPORUM**, D. Don (*Æschynanthus*, Jack). Woody plants often climbing on trees, cult. in the warmhouse for the attractive fls.; about 55 species, India, Malaya, and E. trop. Asia.—Free-flowering shrubs or subshrubs, glabrous or villous: lvs. opposite or occasionally in 3's or 4's, fleshy or leathery: fls. showy, solitary or clustered, axillary or at the tips of the shoots; calyx-tube long, the limb 5-toothed or -parted, usually deciduous; corolla mostly with elongate somewhat curved tube and 2-lipped usually oblique limb; stamens 4, commonly exserted, the anther-cells parallel and distinct or nearly so; disk annular, often weakly 5-lobed; ovary superior, oblong or linear: caps. long-linear, 2-valved. (Trichosporum: Greek *hair* and *seed*, the seeds with 1 or more long hairs at the ends.)

Corolla glabrous, three times longer than calyx.....1. *T. pulchrum*  
Corolla downy, not over twice as long as calyx.....2. *T. Lobbianum*

**1. T. pulchrum**, Blume. Plant trailing: lvs. short-petioled, broadly ovate, distantly small-toothed, fleshy, with sunken veins: fls. clustered, terminal, the fl.-stalk 2-fld., with 2 bracts; corolla glabrous, brilliant scarlet with yellow throat, three times longer than the glabrous greenish calyx, the tube with globose base, the limb scarcely 2-lipped; stamens about equaling the upper corolla-lip. Java.

**2. T. Lobbianum**, Kuntze. Differs from the preceding in having narrower nearly entire lvs.; corolla downy, twice or less as long as the purple downy calyx. (Named for Thos. Lobb, a collector of this species.) Java.

**9. STREPTOCARPUS**, Lindl. CAPE-PRIMROSE. Choice greenhouse herbs, grown for the showy bloom; about 60 species, natives of S. Afr. and Madagascar.—Plant stemless, with 1 or more spreading radical lvs. or rarely with a st. and opposite lvs.: fls. pale purple or blue, 1 or 2 or several, sometimes cymose, on scape-like or axillary peduncles; calyx small, divided into 5 linear segms.; corolla with long cylindric tube and 2-lipped limb, the 5 lobes somewhat unlike, rounded; perfect stamens 2, inserted high on the corolla-tube, the anther-cells confluent at apex, not parallel; disk short-annular; ovary superior, imperfectly 4-celled: caps. linear, splitting into 2, rarely 4 valves. (Streptocarpus: Greek *twisted fruit*.)

**S. kewensis**, Hort. (*S. Rexii* × *S. Dunnii*). Garden hybrid, acaulescent, with 2-3 large, oblong or elongate-ovate, bright green lvs.: fl.-sts. numerous, forming a rather compact mass, each stalk 6-8-fld.; corolla about 2 in. long,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. across, bright mauve-purple, the throat striped with dark brownish-purple. The parent species are both S. African.

**10. SAINTPAULIA**, Wendl. Four herbaceous species grown in the greenhouse, native in trop. Afr.—Mostly acaulescent hairy perennials with long-petioled fleshy lvs. in a basal cluster and violet fls. in a loose few-fld. rather long-peduncled cyme: fls. 5-merous, zygomorphic; calyx deeply 5-parted; corolla-tube short, the limb 2-lipped, spreading, with elliptic lobes; stamens 2, the anther-cells confluent at apex, not parallel; staminodes 2; disk annular; ovary hairy: caps. oblong, loculicidally 2-valved. (Saintpaulia: from the discoverer of the plant, Baron Walter von Saint Paul.)

Lvs. crenate: caps. narrow-oblong.....1. *S. ionantha*  
Lvs. entire: caps. much broader.....2. *S. kewensis*

1. *S. ionantha*, Wendl. AFRICAN-VIOLET. USAMBARA-VIOLET. Lvs. many, rotund or oblong-ovate,  $1\frac{1}{2}$  in. long, shallowly crenate, hairy, all basal or nearly so, forming a tuft  $\frac{2}{3}$ –1 ft. in diam.: peduncles 1–4 in. long, 1–6-fld.; calyx-lobes linear; corolla to about 1 in. across, the lobes somewhat unequal: caps. narrow-oblong.—One var. has deep violet fls. much larger than the type; another has lvs. variegated with light yellow changing to white.

2. *S. kewensis*, C. B. Clarke. Lvs. entire, with numerous long white hairs: calyx-lobes oblong-linear: caps. two to three times as broad as in the preceding and more shaggy, white-hairy.

### 157. GLOBULARIACEÆ. GLOBULARIA FAMILY

About two dozen herbs and shrubs in 3 genera, from the Cape Verde Isls. to Socotra, known chiefly in the Medit. region, yielding plants for ornament.—The shrubs are usually heath-like, the herbs low and mostly caespitose or repent: fls. small, in Globularia in dense globular bracted or involucrate heads; corolla 2-lipped, the upper lip short and 2-lobed, the lower 3-lobed; calyx 5-toothed or -lobed; stamens 2 or 4, attached in the tube; ovary 1, superior, 2-celled or 1-celled by abortion, with a single terminal style, and 1 hanging ovule in each cell: fr. a little indehiscent nutlet included in the calyx.

**GLOBULARIA**, L. About a score of herbs or little subshrubs in S. Eu. and S. W. Asia, mostly in mountainous regions, with characters of the family description. (Globularia: fls. in globular heads.)

*G. trichosantha*, Fisch. & Mey. GLOBE-DAISY. Low tufted somewhat glaucous perennial with clustered radical lvs. spatulate-oval, minutely serrulate, toothed or emarginate at the rounded apex, the blade part mostly under 1 in. long; st.-lvs. narrow and smaller, the upper ones very mucronate-pointed: heads about  $\frac{1}{2}$  in. across, single, terminating sts. 8 in. or less high, fls. blue, the slender-lobed calyx hairy. Asia Minor; grown in rockeries and borders.

### 158. ACANTHACEÆ. ACANTHUS FAMILY

Probably 2,000 species, in 170–180 genera, mostly in the tropics around the world, but some of them extending into temp. regions; they yield many plants for ornament, particularly under glass.—A difficult family for the beginner, as the characters of separation are technical, some of the best of them residing in the anthers and the pollen-grains: it is known specially by the convolute or imbricate aestivation of the corolla which is usually irregular or 2-lipped, stamens 2 or else 4 in 2 pairs, ovary superior, fr. capsular and 2-celled and usually dehiscing elastically, lvs. opposite, simple and exstipular: mostly herbs bearing bisexual fls., often with a tube and limb 5-lobed or -toothed, infl. prevailing spicate or glomerate and prominently bracted; style 1 and mostly long and very slender (often long-exserted) and commonly remaining after the corolla has fallen, stigmas 1 or 2, ovules 1 to many in a cell; stamens inserted on the corolla, and sometimes a staminode present; seeds borne on little hooks with the exception of the Thunbergia tribe (amongst ours).

- A. Limb of corolla developed on one side into a single large obovate lip: fertile stamens 4. (No. 10 is not to be sought here.)..... 1. ACANTHUS
- AA. Limb 2-lipped or nearly regular.
  - B. Corolla twisted or convolute in the bud (or at least not all the lobes imbricate).
    - c. Each cell of ovary with 2 side-by-side ovules (sometimes reduced to 1 by abortion): perfect stamens 4..... 2. THUNBERGIA
  - CC. Each cell with 2 or more ovules one above the other or alternate.
    - D. Seeds 4 (unless aborted) in each caps.
      - E. Tube of corolla very slender: fls. in dense spikes; perfect stamens 2..... 3. ERANTHEMUM
      - EE. Tube broad or widening upward: fls. usually not in close spikes; perfect stamens 4 or 2..... 4. STROBILANTHES
    - DD. Seeds 6 or more (unless aborted) in the caps.
      - E. Perfect stamens 4..... 5. RUELLIA
      - EE. Perfect stamens 2..... 6. SANCHEZIA

- BB. Corolla not convolute, the lobes variously imbricate.
- C. Lobes of corolla expanding flat or nearly so, the corolla not 2-lipped although perhaps not regular.
- D. Perfect stamens 2. (See also No. 11.)
- E. Corolla-lobes small, in ours about  $\frac{1}{2}$  in. long:..... 7. ODONTONEMA
- EE. Corolla-lobes large and prominent..... 8. PSEUDERANTHEMUM
- DD. Perfect stamens 4 (exception in No. 11).
- E. Calyx 4-parted, 2 of the lobes larger..... 9. BARLERIA
- EE. Calyx 5-parted.
- F. Tube of corolla cylindrical and slender; fls. densely spicate..... 10. CROSSANDRA
- FF. Tube much enlarging upward; fls. (at least in ours) not spicate..... 11. MACKAYA
- CC. Lobes very unequal, the corolla strongly 2-lipped, or if nearly equal then lobes only 4
- D. Perfect stamens 4, anthers 1-celled..... 12. APHELANDRA
- DD. Perfect stamens 2, anthers 2-celled.
- E. Anther-cells alike and equal.
- F. Staminodes 2, small..... 13. GRAPTOPHYLLUM
- FF. Staminodes 0.
- G. Lvs. with ordinary or green veins; grown for the fls..... 14. SCHAUERIA
- GG. Lvs. with white or colored veins; grown for the foliage..... 15. FITTONIA
- EE. Anther-cells unlike in shape, size or position, one often above the other.
- F. Lower anther-cell commonly spurred; stamens inserted in throat of corolla, exerted.
- G. Connective (separating the anther-cells) narrow and little noticeable; floral bracts, in ours, not conspicuous..... 16. JUSTICIA
- GG. Connective broad, so that anther-cells are much separated; bracts, in ours, broad and showy..... 17. BELOPERONE
- FF. Lower anther not spurred, although sometimes acute or apiculate. (No. 17 may be sought here.)
- G. Stamens attached in middle of corolla-tube, exerted.... 18. JACOBINIA
- GG. Stamens attached in bottom of tube, in ours scarcely or little exerted..... 19. PACHYSTACHYS
- GGG. Stamens inserted in throat of corolla, exerted..... 20. PERISTROPHE

1. **ACANTHUS**, L. BEARS BREECH. A score or more of perennial herbs or small shrubs in the Medit. region, Asia and Afr., a few of which are planted for ornament. The cult. kinds are thistle-like perennials or subshrubs, with stately simple sts. 3-4 ft. high and mostly radical lvs., the showy fls. in long heavy erect spikes; lvs. mostly sinuate-dentate to pinnatifid, the teeth often ending in spines; fls. subtended by a large foliaceous more or less colored spiny bract, and by 2 narrow often spine-tipped lateral bractlets; calyx 4-parted, 2 lobes very large and 1 of them often spine-toothed, the 2 interior ones very small and scale-like; corolla with a very short tube from one side of which extends a single large 3-5-lobed expanded lip; stamens 4, attached at throat of tube, the filaments very thick and prominent, the anthers yoked; ovules 2 in each cell, the style shortly 2-lobed; caps. oblong or ovoid, scarcely contracted at base, 4-seeded. (Acanthus: Greek *thorn*.)

- Lvs. spiny-toothed..... 1. *A. montanus*  
 Lvs. not spiny, sinuate-lobed..... 2. *A. mollis*

1. **A. montanus**, T. Anders. Subshrubby, sts. nearly or quite glabrous; lvs. long-oblong, 1 ft. or more long, pinnatifid, those on the st. more or less ovate and 4-8 in. long and dentate, all of them spinose on the margins, scabrous and more or less hairy on veins beneath; fls. rose-tinted and prominently veined, in a terminal spike on a leafy st. W. Afr.; sometimes carried under glass in the N.

2. **A. mollis**, L. St. strict and straight, pubescent above; lvs. mostly radical, oblong to oblong-ovate, more or less cordate, 1-2 ft. long and half as broad on mature plants, sinuate-lobed or -pinnatifid, sometimes with lobes separate at base of blade, without spines; fls. whitish, rose or lilac, in spikes 1½ ft. long. S. Eu. - Var. *latifolius*, Vilm. (*A. latifolius*, Goeze), is a larger-leaved, bigger and more robust form.

2. **THUNBERGIA**, L. f. Trop. plants, most of them climbers, woody or herbaceous, several grown for the showy fls.; about 75 species, mostly African



and Asian.—Lvs. opposite, simple, prevailingly hastate at base; fls. solitary in the axils or racemose, yellow, white, blue, purple, subtended by 2 large more or less foliaceous bracts; calyx various, either truncate or 5 15-lobed; corolla large, funnellform or somewhat bell-shaped, the tube curved or straight, limb 5-lobed and nearly regular or at least not distinctly bilabiate; stamens didymous, attached near base of the tube; ovules 2 in each cell; caps. seed-bearing at base, produced into a beak. (Thunbergia: Carl Peter, or Carl Pehr, Thunberg, Swede, 1743–1828, was a student of Linnaeus and a successor, traveler in Japan and S. Afr., of which he wrote floras; sometimes written Karl Peter.)

Plant an erect shrub: fls. solitary, blue with yellow center. . . . . 1. *T. erecta*

Plant twining.

Petiole winged.

Corolla-lobes strongly emarginate. . . . . 2. *T. Gibsoni*

Corolla-lobes essentially truncate or obtuse. . . . . 3. *T. alata*

Petiole not winged.

Lvs. large and thick, 5–8 in. long, coarsely notched, cordate or subcordate. . . . . 4. *T. grandiflora*

Lvs. medium or small, nearly or quite entire, not cordate.

Fls. in terminal or axillary racemes.

Corolla blue, limb expanded. . . . . 5. *T. laurifolia*

Corolla scarlet, limb short and reflexed. . . . . 6. *T. coccinea*

Fls. solitary in axils. . . . . 7. *T. fragrans*

1. *T. erecta*, T. Anders. (*Mayenia erecta*, Benth.). Much-branched glabrous erect shrub, 2–6 ft., the branches flexuose: lvs. ovate, 1–3 in. long, short-petioled, acute, margin entire or obscurely repand-toothed or -angled: fls. solitary on axillary pedicels,  $1\frac{1}{2}$ – $2\frac{3}{4}$  in. long, limb blue-purple, the curved tube yellowish-white; calyx very short, with 10 or more small teeth, hidden by the bracts: caps. 1 in. long, with large flat beak. Trop. Afr.; in cult. varies to white and blue fls.; grown under glass and in the open in Fla. and Calif.

2. *T. Gibsoni*, S. Moore. Perennial herb but readily grown as an annual, twining 4–5 ft., the sts. hairy: lvs. short-ovate or nearly triangular-ovate, 2–3 in. long, subcordate or cordate-sagittate at base, obtuse or only very short-acute at apex, sinuate-toothed, pubescent both surfaces, the petiole  $1\frac{1}{2}$ –2 in. long with the wing expanding upward: fls. solitary on very long axillary hairy peduncles, the corolla orange,  $1\frac{1}{2}$  in. or more across, the lobes broad and emarginate; calyx small, many-lobed; bracts ovate, half or more as long as the corolla-tube, strongly veined and rust-colored. Trop. Afr., at high elevations; first collected at the equator in 1892 by Mr. Gibson.

3. *T. alata*, Bojer. BLACK-EYED SUSAN. Herbaceous perennial twiner but often grown as an annual, with slender hairy sts.: lvs. ovate to triangular-ovate, 1–3 in. long, the base cordate and more or less hastate, obtuse or acutish and usually apiculate, margins repand-toothed, pubescent both surfaces, the long petiole winged: fls. solitary on long axillary pedicels, about  $1\frac{1}{2}$  in. long, limb buff or cream-color and throat dark purple, the 5 segms. rounded; calyx very small, beneath the 2 green bracts that nearly equal the corolla-tube: caps. about 1 in. long, with a globular base and flat beak. Trop. Afr., but now naturalized widely in tropics; sold by seedsmen for the flower-garden; runs into races without the dark eye, also white and other colors.

4. *T. grandiflora*, Roxb. Extensive woody twiner with sts. nearly or quite glabrous: lvs. thick, large, 5–8 in. long, ovate to broad-ovate, 3-nerved from base, cordate or subcordate, acuminate-pointed, angle-toothed or slightly lobed or some of them entire, scabrous or pubescent both surfaces, petiole not winged: fls. in stout dense hanging racemes or sometimes solitary, large and showy, about 3 in. across, light or dark blue or white, the expanded limb almost 2-lipped with 3 lobes beneath and 2 above; calyx reduced to a rim; bracts large, nearly equaling broad corolla-tube. Bengal; now wide-spread in trop. countries, and also grown under glass.

5. *T. laurifolia*, Lindl. (*T. Harrisii*, Hook. f.). Sometimes confused with No. 4, but separated by its narrow not lobed or toothed lvs., which are lanceolate to lance-ovate, 3–5 in. long, rounded or tapering at base, mostly long-acuminate, margins sometimes obscurely repand but not dentate, not scabrous and scarcely pubescent beneath: fls. light blue with whitish or yellowish throat, 3 in. across, in racemes, the large rounded lobes not very unequal. India.

6. *T. coccinea*, Wall. (*Hexacentris coccinea*, Nees). Tall glabrous woody twiner with 4-angled branchlets: lvs. lance-ovate to broad-ovate, 3–5 in. long, subcordate

or hastate at base, acuminate-pointed, 3-5-nerved from base, upper margins entire or somewhat sinuate-dentate: fls. in pendulous mostly large terminal and axillary racemes, the corolla with a scarlet lobed reflexed limb and yellow throat,  $\frac{3}{4}$ - $\frac{1}{2}$  in. across; calyx very small and indistinctly toothed, this and corolla-tube covered by the large spathe-like bracts. India.

7. *T. fragrans*, Roxb. Slender somewhat woody glabrous twiner: lvs. lanceolate to triangular-ovate, 2-3 in. long, broadened or subcordate and with 1 or 2 angle-teeth at base, apex acute, margins entire or somewhat repand, slender-petioled, lightly scabrous: fls. solitary and axillary, white, fragrant, the spreading limb  $1\frac{1}{2}$ -2 in. across, the lobes toothed at apex; calyx small, many-toothed; bracts acute, shorter than the cylindrical tube: caps. about  $\frac{3}{4}$  in. long, with flat beak. India.

3. *ERANTHEMUM*, L. (*Dædalacanthus*, T. Anders.). About a score of shrubs and herbs, native in trop. Asia, one of them a common ornamental under glass and in the open in warm countries.—Lvs. entire or perhaps somewhat dentate: fls. blue or rose-colored, in close bracted often paniced spikes; calyx 5-lobed or -parted, covered by the bracts; corolla with long very slender often curved tube, the limb spreading and 5-lobed, not 2-lipped; perfect stamens 2, attached in throat of corolla: fr. an ovoid or oblong caps., with 4 seeds or perhaps fewer by abortion. (*Eranthemum*: Greek *lovely flower*.)

*E. nervosum*, R. Br. Shrub 2-4 ft., nearly or quite glabrous: lvs. ovate to elliptic, 4-8 in. long, rather thick, prominently pinnate-veined, tapering to mostly long petiole, acuminate, margins obscurely crenate-dentate: fls. in axillary and terminal spikes, with appressed very acute prominently nervose bracts; corolla blue, the tube  $\frac{3}{4}$ -1 in. long and curved, limb about  $\frac{3}{4}$  in. across. India; early known as *Eranthemum pulchellum*, and yet sometimes cult. under that name.

4. *STROBILANTHES*, Blume. Species probably 200, herbs and small shrubs, mostly in the warm parts of Asia, cult. for ornamental bloom or foliage, under glass in the N. and in the open in warm regions.—Lvs. of the pairs sometimes much unlike, entire or toothed: fls. blue, violet, white, less frequently yellowish, solitary in axils or in spikes and panicles; calyx deeply cleft or parted, with narrow segms.; corolla with a narrow or constricted base but much broader above, the 5-lobed limb spreading and more or less unequal but not bilabiate; perfect stamens 4 and didynamous, or sometimes 2 and others represented by staminodes, the filaments more or less connected at base; ovules 2 in each cell; style slender and recurved, mostly evidently 2-lobed at apex: caps. bearing 4 seeds (or fewer by abortion), oblong or linear, scarcely contracted at base. (*Strobilanthes*: Greek *cone-flower*, from the infl. of some species.)

Grown for the bloom: lvs. small and narrow, taper-based, green. . . . . 1. *S. isophyllus*

Grown for foliage: lvs. large, cordate, iridescent. . . . . 2. *S. Dyerianus*

1. *S. isophyllus*, T. Anders. (*Goldfussia isophylla*, Nees). Nearly glabrous branchy shrub, 2-3 ft., with angled twigs: lvs. of the pairs equal (as the name indicates), narrow-lanceolate, willow-like, 2-4 in. long, contracted to short petiole, very long-acuminate, bluntly serrulate, veiny: fls. several on axillary peduncles shorter than the lvs., about 1 in. long, bluish-pink or blue and white, the short blunt corolla-lobes emarginate. India.

2. *S. Dyerianus*, Mast. Branching shrub grown in hothouses for the foliage which is rose-purple beneath and variegated above in iridescent tints of blue and lilac: lvs. elliptic-lanceolate or lance-ovate, 6-8 in. long, contracted or fiddle-shaped toward base, sessile, cordate at attachment, serrulate: fls.  $1\frac{1}{2}$  in. long, in erect spikes, pale violet, the corolla-tube curved, the 5 short broad lobes revolute. (Presumably named in compliment to W. T. Thiselton-Dyer, Director Royal Botanic Gardens, Kew.) Burma.

5. *RUELLIA*, L. Herbs and small shrubs of wide distribution in trop. countries and some of them in temp. regions, a few grown under glass and in the open in mild climates for the showy bloom and sometimes ornamental

foliage; species upwards of 200, largely American.—Plants usually pubescent, the lvs. prevailingly entire and the pairs equal: fls. white to rose, violet, purple, yellow, variously disposed in clusters or panicles or sometimes solitary; calyx deeply cleft or parted, with the parts linear or narrow; corolla with a short or long tube but narrow and slender and the upper part more or less enlarging, the 5 lobes spreading and nearly or quite equal; perfect stamens 4, the filaments dilated and more or less paired or connected at base; ovules 3–10 in each cell; style slender, mostly recurved at apex and simple or 2-lobed: caps. oblong or clavate, mostly stipitate, 6–20-seeded. (Ruellia: Jean de la Ruelle, 1474–1537, French physician and botanist.)

- Fls. very large, 3 in. or more long.....1. *R. macrantha*  
 Fls. 2 in. or less long.  
 Lvs. purple beneath, white-veined above.....2. *R. Devosiana*  
 Lvs. green; not foliage plants.  
 Corolla gibbous at base, the tube scarcely exceeding calyx, limb very short.....3. *R. amœna*  
 Corolla with long and slender tube, the limb large and prominent.  
 Foliage of ovate or oval lvs.  
 Apex of lf. acute or acuminate.....4. *R. formosa*  
 Apex obtuse.....5. *R. nudiflora*  
 Foliage of long and very narrow almost linear lvs.....6. *R. malacosperma*

1. *R. macrantha*, Mart. Shrub to 6 ft., with nearly glabrous angular branches constricted above the ciliate nodes: lvs. ovate-lanceolate, 4–6 in. long, tapering both ways, essentially entire, with small scattered hairs: fls. axillary and contiguous, rosy-purple with prominent veins, 3 in. or more long and about the same in breadth, the lower half of corolla-tube slender and cylindrical but the upper part much expanded, the 5 lobes rounded and spreading. Brazil.

2. *R. Devosiana*, Morr. Shrubby with more or less decumbent base and erect branches, 1–1½ ft., sts. pubescent: lvs. elliptic, 1½–2 in. long, short-acute, slender-petioled, entire, velvety, purple beneath, white-ribbed and -veined above: fls. solitary and sessile, about 1¾ in. long, white with lilac throat and lines, tube slender but widening above, lobes nearly ½ in. long and emarginate. (Dedicated to A. Devos of the Univ. of Liege.) Brazil; grown for foliage.

3. *R. amœna*, Nees (*R. longifolia*, Griseb., not Rich. or T. Anders. *Stephanophysum longifolium*, Pohl). Subshrub, 1–2 ft., usually herbaceous as grown in pots, twigs glabrous or puberulent: lvs. ovate to oblong-lanceolate, 2–5 in. long, somewhat narrowed into short petiole, acuminate, serrate to repand, more or less finely puberulent: fls. several on long axillary peduncles that branch as they grow, bright red, about 1 in. long, the corolla-tube suddenly expanding just above the linear-lobed calyx, the 5-lobed limb short. S. Amer.; has the look of *Peristrophe speciosa*, but corolla not bilabiate; apparently the commonest species, and grown under several names.

4. *R. formosa*, Andr. Little subshrub, with hairy twigs: lvs. ovate, 2–3 in. long, rounded at base, acute or acuminate at apex, more or less hairy both surfaces: fls. showy, scarlet, about 1½ in. long, on long straight erect somewhat forking peduncles, the 2 upper lobes joined half or more their length; tube of corolla somewhat curved, gradually widening upward, twice or more longer than very narrow pointed calyx-lobes. Brazil.

5. *R. nudiflora*, Urban. Erect, somewhat woody at base, puberulent, 12–16 in. high, the infl. forking: lvs. oval-obtuse, 1–2 in. long, tapering to petiole, crenulate, nearly or quite glabrous: fls. about 1¾ in. long, violet, with slender cylindrical tube exceeding the subulate calyx-lobes and which is then widely expanded above; limb nearly regular, the lobes obtuse: caps. pubescent. Southern states and Mex. and sometimes planted; has been confused with the tuberous-rooted glabrous-fruited *R. tuberosa*, L., of the tropics.

6. *R. malacosperma*, Greenm. Woody, erect, 2–3 ft., with virgate side branches, st. glabrous: lvs. many, firm, 5–6 in. long and mostly ½–¾ in. broad, very long-tapering and the point very sharp, veins prominent, mostly glabrous both surfaces: fls. 1¼–1½ in. long, blue-purple, cylindrical part of corolla-tube not much exceeding subulate calyx-lobes, tube expanded above; limb spreading, obtuse: fr. glabrous. Cult. in Mex. and Cent. Amer. where it is perhaps native, and planted in our southern parts and sometimes grown under glass; likely to be mistaken for *Strobilanthes isophyllus*.

6. **SANCHEZIA**, Ruiz & Pav. About a dozen strong erect large herbs and shrubs of S. Amer., one grown in the warmhouse in the N. for the ornamental foliage and showy spikes.—Lvs. large, strongly pinnate-veined, entire or somewhat toothed: fls. large and showy, orange, red, or purple, with large calyx-like bracts, in terminal and axillary spikes or in some species solitary; corolla-tube long, cylindrical below and enlarging upward, the 5 lobes short and broad; perfect stamens 2, attached below middle of tube, with 2 staminodia between them, the 2 anther-cells mucronate; ovules 4 in each cell; style very slender, obscurely 2-lobed at apex: caps. scarcely contracted at base, the seeds normally 8. (Sanche-zia: Jos. Sanchez, early professor of botany at Cadiz.)

**S. nobilis**, Hook. f. Shrub 3-4 ft., with strong upright branches, sts. glabrous except perhaps in infl.: lvs. oblong-ovate, 4-12 in. long, short-petioled, tapering at base, abruptly acuminate, sinuate-dentate to nearly entire: fls. 2 in. long, the corolla yellow, with revolute rim; bracts 1-1½ in. long, red. Ecuador.—There are named cultivars with variegated lvs.

7. **ODONTONEMA**, Nees (*Thyrsacanthus*, Nees). About 20 shrubs and herbs in trop. Amer., several of which have been more or less grown for ornament, one apparently now frequent on our southern borders and southward.—Lvs. usually large and entire: fls. red, commonly many in terminal spicate racemes in the axils of small and inconspicuous bracts; corolla with slender straight or slightly curved tube that much exceeds the narrow-lobed calyx, the tube somewhat widened toward the top; corolla-limb essentially regular (in ours) or somewhat 2-lipped, the upper lip entire or 2-toothed and the lower 3-lobed; stamens 2, attached in upper part of tube, with dorsifixed anthers of which the 2 cells are equal or nearly so and not spurred; staminodia 2 and small; ovules 2 in each cell. (Odontone-ma: Greek combination referring to toothed filaments.)

**O. strictum**, Kuntze. Nearly or quite glabrous erect shrub, 5-6 ft.: lvs. oblong-ovate to oblong-lanceolate, 3-6 in. long, acuminate, very short-petioled, entire but often undulate, more or less short-hairy on veins beneath: fls. bright crimson, ¾-1 in. long, straight, in erect simple close racemes, the limb regular or practically so and the little obtuse lobes about ½ in. long. Forests of Cent. Amer.; grown as *Justicia coccinea* (not *J. coccinea*, Aubl. nor Cav.)

8. **PSEUDERANTHEMUM**, Radlk. (*Eranthemum*, Auth., not L.). Species 60-70 or more in many trop. countries, a few small shrubs grown under glass for the attractive bloom and often colored foliage.—Herbaceous or woody, erect, glabrous: lvs. entire or coarsely toothed: fls. white, blue, purple, red, often more or less marked with yellow, 1-3 in the axils of linear bracts and arranged in spikes, cymes or racemes; calyx with 5 narrow lobes; corolla with long or short tube, the 5 spreading lobes nearly equal or the 2 posterior ones smaller; perfect stamens 2, attached in the tube, staminodes 2; ovules 2 in each cell; style filiform, apex entire or 2-toothed: caps. oblong, stipitate, seeds 4 unless aborted. (*Pseuderan-themum*: false *Eranthemum*.)

Tube of corolla very slender, about 1 in. or more long. .... 1. *P. bicolor*

Tube not slender, ½ in. or less long.

Lvs. broad-ovate, usually marked wine-red. .... 2. *P. atropurpureum*

Lvs. ovate-lanceolate to lanceolate, usually veined yellow. .... 3. *P. reticulatum*

1. **P. bicolor**, Radlk. (*Eranthemum bicolor*, Schrank). Shrub, 2-3 ft., sts. glabrous: lvs. narrow- or long-ovate, 4-8 in. long, tapering to short petiole, very long-acuminate, dark green, entire, glabrous: fls. sessile in clusters on elongating axillary and terminal unbranched spikes, salverform, white with lower lobes spotted purple, corolla-tube cylindrical and very slender, 1- about 1½ in. long, the 5 spreading lobes oval and obtuse, the expanded corolla 1 in. or somewhat more across; calyx-lobes acute but not subulate. Probably Polynesia.

2. **P. atropurpureum**, Bailey (*Eranthemum atropurpureum*, Bull, not Hook. f.). Glabrous shrub, 3-4 ft.: lvs. broad-ovate to oval, 3-6 in. long and usually about



two-thirds as broad, rounded or slightly tapering at base and short-petioled, apex broad and obtuse but usually with a little point, entire, wine-purple or pink-purple and variously blotched (but sometimes green and sometimes spotted yellow): fls. short-pedicelled and clustered on axillary and terminal spikes, white with rose-purple center and spots but sometimes entirely purplish, the tube rather stout and about  $\frac{1}{2}$  in. long, the 5 obtuse lobes spreading to  $\frac{3}{4}$ –1 in. across. Probably Polynesia; frequent in American tropics.—The plant known as *Eranthemum Eldorado* is probably a form of it; lvs. sometimes yellow-blotched.

3. *P. reticulatum*, Radlk. (*Eranthemum reticulatum*, Bull.). Shrub, 2–3 ft., with angled glabrous branchlets: lvs. ovate-lanceolate, 5–10 in. long, mostly abrupt or rounded at base, the petiole short, long-tapering but apex obtuse, entire but undulate, dark green with golden veins: fls. short-pedicelled in axillary and terminal panicles, white with wine-purple throat and spots on one lobe, the rather thick tube about  $\frac{1}{2}$  in. long, the 5 oblong obtuse spreading lobes about  $1\frac{1}{2}$  in. across; calyx-lobes linear-subulate. Probably Polynesia.

9. *BARLERIA*, L. One hundred and fifty or so species of shrubs and herbs, nearly all in the Old World tropics, a few sometimes grown under glass for the showy fls. and planted out in warm countries.—Glabrous or pubescent, erect, sometimes spiny: lvs. entire: fls. showy (in the cult. kinds), white, blue or yellow, solitary or fascicled in the axils, sometimes in terminal spikes, accompanied by large often spinose bracts; calyx 4-parted, the 2 outer ones large, the lateral interior ones small and narrow; corolla-tube mostly long, the lower part slender and upper part broad, the 5 spreading broad lobes mostly subequal; perfect stamens 4 and didynamous, attached near base of corolla; ovules 2 in each cell, the style mostly entire: caps. ovoid or oblong, bearing normally 4 seeds. (Barle-ria: Jacques Barrelier, 1634–1673, French botanical collector and author.)

*B. cristata*, L. Little shrub, 2–3 ft., branches yellowish-pubescent, sts. not spiny: lvs. elliptic, 1–3½ in. long, tapering to short petiole, short-acute, scabrous-puberulent: fls. blue, nearly or quite sessile in the axils, corolla about 2 in. long; bracts elliptic,  $\frac{3}{4}$  in. long, strongly nerved and light green or whitish, with long spiny teeth; corolla-lobes obtuse. India.—*B. cærulea*, Roxb., has much larger lvs. and fls., the axillary fascicles large, the big bracts entire. India.

10. *CROSSANDRA*, Salisb. Shrubs and herbs with showy fls. in thick four-sided spikes; species probably 20 and more, in the Old World tropics; choice plants under glass.—Glabrous for the most part, erect: lvs. sometimes whorled, entire or toothed: fls. white, yellow, orange-red, sessile in dense axillary and terminal bracted spikes with imbricate bracts and linear bractlets; calyx 5-lobed, strongly irregular; corolla slender-tubed, the limb usually split to the throat so as to make a single lip; perfect stamens 4, didynamous; ovules 2 in each cell; style shortly 2-lobed: caps. oblong, more or less 4-angled, seeds normally 4. (Crossan-dra: Greek *fringed anthers*.)

*C. infundibuliformis*, Nees (*C. undulæfolia*, Salisb.). Shrub, 1–3 ft., pubescent toward the top: lvs. narrow-ovate to lanceolate, 3–5 in. long, narrowed to petiole, acuminate, more or less undulate, puberulent or glabrous: fls. scarlet-orange, in dense pubescent sessile or stalked spikes, the slender tube  $\frac{3}{4}$  in. long, the one-sided limb about 1 in. across; bract about as long as the caps.; seeds bearing feather-like scales. India.

11. *MACKAYA*, Harv. As now accepted, a genus of 4 shrubs, 1 in Afr. and 3 in India, the former in frequent cult. under glass and in the open in S. Calif. and elsewhere.—Corolla somewhat curved, much broadened in the upper half, the 5 prominent lobes subequal; perfect stamens 2, and 2 long filiform staminodes, the anthers mucous and equal; ovules 2 in each cell; stigma 2-lobed; floral bracts very small: caps. stipitate. (Mackay-a: James T. Mackay, about 1775–1862, Irish botanist.)

*M. bella*, Harv. (*Asystasia bella*, Benth. & Hook.). Nearly or quite glabrous, 3–4 ft.: lvs. oblong to ovate-oblong, 3–5 in. long, tapering below to short petiole,

gradually or abruptly pointed, the margins variously sinuate-dentate: fls. several in terminal raceme,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long and as much across, lavender and veined; calyx small, with linear-subulate lobes. S. Afr.

12. **APHELANDRA**, R. Br. Herbs and shrubs of trop. Amer., producing spikes of showy bloom, for which they are grown under glass; species 70 or 80.—Lvs. usually many and ample, often showy, entire or toothed: fls. sessile in dense simple or branched axillary and terminal spikes, with large often colored imbricating bracts; corolla yellow, orange, red, strongly 2-lipped, upper lip ascending and lower one usually outspreading or declined or rolled; perfect stamens 4, attached in base of the mostly cylindrical corolla-tube, the 1-celled anthers equal and pointed; ovules usually 4 in each cell; style entire: caps. oblong, little if at all contracted at base, the seeds normally 4. (Aphelan-dra: Greek *simple anther*.)

Side lobes of lower lip similar to central lobe.

Fls. pale yellow: lvs. white-veined.....1. *A. squarrosa*

Fls. orange: lvs. green.....2. *A. aurantiaca*

Side lobes very small: fls. scarlet.....3. *A. tetragona*

1. ***A. squarrosa***, Nees (*A. Leopoldii*, Hort.). Robust glabrous more or less succulent plant: lvs. crowded, ovate to ovate-elliptic, 8–12 in. long, acuminate, entire, pale green beneath but dark green above and in the cult. plant with white rib and veins: fls. pale yellow,  $1\frac{1}{2}$  in. long, somewhat exserted, lobes of lip oblong, the densely imbricated bracts orange-yellow; spikes terminal, solitary or in 3's. Brazil.

2. ***A. aurantiaca***, Lindl. Plant of medium size and stature, glabrous: lvs. ovate-elliptic or oblong, 4–6 in. long, acuminate, entire, more or less undulate, strongly veined, light green beneath and deep green above: fls. orange sometimes tinged scarlet, the lower lip with large oval-pointed declined lobes; bracts serrate. Mex.; long in cult.

3. ***A. tetragona***, Nees. Shrub with nearly or quite glabrous branches: lvs. large, elliptic to elliptic-ovate, 4–9 in. long, tapering to petiole, acuminate, entire, green, lightly hairy beneath: fls. long and narrow, the tube 2 in. long, scarlet, upper lip hooded, lower with 1 long narrow lobe and 2 very small lateral lobes, in clustered four-sided spikes; bracts obtuse, pubescent. W. Indies, S. Amer.; a showy plant.

13. **GRAPTOPHYLLUM**, Nees. Trop. shrubs of Australia and Polynesia, 4 or 5 species, one of them widely grown in warm regions for the handsome foliage.—Glabrous, with entire or dentate lvs., which are often colored and variegated: fls. pedicelled, red or purple, in short nearly sessile cymes or panicles, the bracts and bractlets very small and not covering the linear-lobed calyx; corolla with curved tube, 2-lipped, the upper lip 2-lobed and lower 3-lobed; perfect stamens 2, staminodia 2 and small, anthers 2-celled and sharp-pointed below; ovules 2 in each cell; style somewhat 2-toothed: caps. contracted into stalk. (Graptophyl-lum: Greek *to write, leaf*, from the pictured foliage.)

***G. pictum***, Griff. (*G. hortense*, Nees). Erect, to 8 ft.: lvs. elliptic, 4–6 in. long, more or less tapering to short petiole, acuminate or short-acute, entire, purplish or green, variously marked and spotted yellow: fls. dark purple or crimson, about  $1\frac{1}{2}$  in. long, some of them yawning and strongly 2-lipped with side lobes of lower lip turned down; stamens ascending and prominent. Probably New Guinea.

14. **SCHAUERIA**, Nees. Eight to 10 erect herbs or small shrubs, Mex. and Brazil and 1 described from trop. Afr., one of which is frequent under glass for its showy yellow bloom.—Lvs. entire: fls. yellow or red, in a close terminal spike or thyrses which has a somewhat hairy appearance from the long and slender calyx-lobes and the very narrow bracts on the rachis and branches; corolla with long narrow tube somewhat enlarging upward, 2-lipped, the upper one erect, entire or emarginate, the lower lip with 3 nearly equal mostly recurved segms.; perfect stamens 2, and no staminodes, inserted in the tube, the

anthers alike and not pointed; style filiform; ovules 2 in each cell: caps. slender and stalked. (Schaueria: J. C. Schauer, 1813-1848, was a professor in Greifswald, Prussia.)

*S. flavicoma*, N. E. Br. (*S. calicotricha*, Hort., not Nees. *Justicia flava*, Hort., not Kurz). Woody, glabrous or essentially so, 2-4 ft.: lvs. ovate to ovate-lanceolate, 4-6 in. long, mostly broad at base, long-acuminate, undulate, shining; fls. light yellow, 1½ in. long, in close head-like short-peduncled panicles, the glandular-hairy subulate calyx-lobes half or more as long as the corolla. Brazil.

15. **FITTONIA**, Coem. Low or creeping herbs, 2 or 3 reputed species, probably forms of one, grown under cover for the handsome foliage, native in S. Amer., probably in Peru.—Sts. very hairy: lvs. broad, entire, with colored veins on upper surface: fls. pale or yellowish, small and not ornamental, underneath broad obtuse or short-acute scales in long slender spikes; calyx deeply cut, the lobes equal or one of them larger; corolla with a slender tube, deeply 2-lipped; stamens inserted at middle of tube, the anthers not pointed; ovules 2 in each cell; style filiform, with 2-notched stigma: caps. ovate, long-stipitate. (Fittonia: dedicated to Elizabeth and Sarah Mary Fitton, authors of "Conversations on Botany," that appeared in London in the early part of past century.)

Sts. creeping and rooting, herbaceous: lvs. obtuse.....1. *F. Verschaffeltii*  
Sts. erect or ascending, becoming somewhat woody: lvs. with very  
short point.....2. *F. gigantea*

1. *F. Verschaffeltii*, Coem. Low creeping and rooting herb with shaggy-hairy sts.: lvs. oval to nearly ovate, 3-4 in. long, rounded or subcordate at base, mostly rounded at apex, dark green with deep red veins and midrib. (Bears the name of Ambroise Verschaffelt, 1825-1886, Belgian horticulturist.)—Var. *Pearcei*, Nichols., has veins and midrib bright carmine and under surface somewhat glaucous. Var. *argyroneura*, Nichols., has lvs. bright light green with veins and rib white.

2. *F. gigantea*, Lind. Erect and branching, 12-18 in., becoming somewhat shrubby: lvs. with a very short point, veins and rib carmine.

16. **JUSTICIA**, L. Herbs and shrubs of wide-spread trop. distribution, 250-300 species if the genus is defined broadly, 100 or more species if taken in a restricted sense; few are cult., the ornamental plants grown under this name being mostly Jacobinias.—Calyx deeply 5-parted (only seldom 4-parted), the lobes usually about equal: fls. small or large, white, violet or red, solitary, racemose, spicate or fascicled, sometimes with prominent imbricated bracts; corolla straight or curved, 2-lipped, tube short and mostly dilated above, upper lip erect or ascending and entire or 2-toothed, lower one spreading and 3-lobed; stamens 2 and staminodia none, attached in the throat and exserted or prominent, the anthers unequal in height and one of them produced below into a spur or evident point; stigma capitate or 2-toothed: caps. ovate or oblong, with 2 or 4 seeds. (Justicia: James Justice, Scotch gardener, author of "British Gardener's Director," 1754.)

*J. secunda*, Vahl. RED JUSTICIA. Shrub to 8 ft., puberulous above: lvs. ovate-oblong to lance-ovate, somewhat tapering to petiole, very long-acuminate, entire or obscurely crenate: fls. in a terminal narrow elongating panicle, red, 1½ in. long, narrow, lips longer than tube; calyx-lobes sharp, much shorter than corolla-tube; bracts smaller than calyx. W. Indies, N. S. Amer.

17. **BELOPERONE**, Nees. Trop. American shrubs or subshrubs of some 30 species, one of which has recently come into cult. in the S. U. S., planted in the open and also to some extent as an attractive pot-plant under glass.—From *Justicia* the genus is distinguished by the broad connective or upper part of filament, whereby the 2 anther-cells are considerably separated so that the edges are not at all contiguous; anther-cells mostly unlike, one standing higher

than the other, one or both of them sharp-pointed or spurred on the lower end: fls. 2-lipped, and much as in *Jacobinia*, the lower lip 3-lobed: caps. long-stalked, the floral bracts often large and imbricate. (*Beloperone*: Greek, from the arrow-shaped anthers.)

**B. guttata**, Brandegee. Much branched from base, 12–20 in., the terete sts. short-hirsute: lvs. ovate, 1–2½ in. long, short-acuminate, abruptly tapering to slender petiole, entire, short-hirsute both surfaces: fls. in curving-erect strobile-like spikes 2½–3½ in. long borne beneath ornamental overlapping reddish-brown broad-ovate pubescent bracts ½–¾ in. long; corolla slender and exserted beyond the bracts, 1¼ in. long, divided nearly to the middle into narrow lips, white and pubescent but lower lip with 2 rows of purplish spots in throat; upper lip entire; lower lip somewhat declined but not recurved, a little longer and broader than the upper and with 3 shallow close obtuse lobes; calyx about one-fourth as long as corolla-tube, whitish, 5-cleft and regular; stamens 2, ascending under the upper lip but not exserted, the lower anther-cell more pointed at base; style filiform and slightly exserted, the stigma small and entire; ovules 2 in each cell. Mex.

18. **JACOBINIA**, Moric. (Incl. *Cyrtanthera*, Nees). Herbs and shrubs of the American tropics, 20–40 species, distinguished from *Justicia* by the absence of spur-like points on anthers: stamens usually attached about the middle of corolla-tube, staminodia often represented by 2 hairy elevations, and dissimilarities in pollen-grains. (*Jacobinia*: probably a personal name.)

Infl. a dense head-like thyrses or spike, often with broad floral bracts.

Floral bracts acute.

Fls. yellow.....1. *J. aurea*

Fls. purplish or flesh-colored.....2. *J. carnea*

Fls. crimson.....3. *J. Pohliana*

Floral bracts (at least above the base) obtuse.....4. *J. obtusior*

Infl. open, racemose, paniculate, or fls. solitary, bracts not prominent.

(*Libonia*, C. Koch. *Sericographis*, Nees.)

Corolla deeply bilabiate, the lower lip coiled or deflexed.

Calyx-lobes triangular- or ovate-acute.....5. *J. Ghiesbreghtiana*

Calyx-lobes linear and long-acute.....6. *J. spicigera*

Corolla shortly bilabiate, lower lip not reflexed or coiled.

Length of corolla about 1 in. or less: lvs. essentially obtuse.....7. *J. pauciflora*

Length 1¼ in. or more: lvs. acute.....8. *J. penrhoniensis*

1. **J. aurea**, Hemsl. Shrub, 4–6 ft., with thick more or less angled puberulent sts.: lvs. oval or ovate, 6–10 in. long, rounded or very broad at base, acuminate, entire or sinuate, mostly puberulent beneath: fls. yellow, in dense terminal spike-like thyrses; corolla pubescent, about 2 in. long, lipped to the middle; bracts not conspicuous, narrow and acute. Cent. Amer.

2. **J. carnea**, Nichols. (*Justicia carnea*, Hook. *J. magnifica*, Pohl). Stout forking pubescent shrub, 2–5 ft., with short internodes: lvs. ovate or oblong, 6–7 in. long, tapering at base, acuminate, entire or crenulate: fls. rose-purple or flesh-colored, in dense terminal heads about 4 in. long with oblong acuminate bracts ¾ in. long; corolla about 2 in. long, viscid-pubescent, lipped to the middle or below, the lower lip broad. Brazil; apparently little cult.

3. **J. Pohliana**, Lindau. More robust and leafy than No. 2 and less pubescent, even nearly glabrous: lvs. ovate-oblong or ovate, acuminate, often purple-tinged: fls. bright crimson, in a long or oblong spike; bracts ovate-acute. Brazil (where it was early collected by J. E. Pohl).

4. **J. obtusior**, Bailey (*Cyrtanthera Pohliana* var. *obtusior*, Nees). Plant glabrous: lvs. lanceolate to lance-ovate, long-acuminate: infl. short and compact, the floral bracts very obtuse or perhaps the outer involucrel ones somewhat acute; fls. pink to crimson. Brazil.—**J. velutina**, Voss (*C. Pohliana* var. *velutina*, Nees) is similar but velutinous. Brazil, Buenos Aires.

5. **J. Ghiesbreghtiana**, Nichols. (*Justicia Ghiesbreghtiana*, Lem.). Glabrous or lightly pubescent shrub to 5 ft., nodes somewhat enlarged, much branched: lvs. lance-ovate to narrow-elliptic, 3–6 in. long, tapering both ways, short-petioled, entire, arching: fls. mostly 2 together and sessile in forking axillary peduncled open little panicles with small bracts not larger than the calyx; corolla orange to crimson, mostly upwards of 1½ in. long, lipped about one-third distance from apex, about ¼ in. broad at widest part, the rather broad lower lip deflexed and becoming coiled; calyx with broad but acute lobes about ½ in. long. Mex., introduced from the collections of Ghiesbreght.



6. *J. spicigera*, Bailey (*Justicia spicigera*, Schlecht. *Justicia atramentaria*, Benth. *Justicia Mohinli*, Moc. & Sessé). Fls. more slender than in No. 4, orange-yellow to purplish, lvs. smaller and narrower; calyx-lobes longer, linear-acute to nearly subulate: shrub to 10 ft. Mex.

7. *J. pauciflora*, Lindau (*Libonia floribunda*, C. Koch). Little shrub, 1-2 ft., with terete pubescent sts.: lvs. small, unequal in the pairs, oblong to oval to obovate,  $\frac{3}{4}$  in. or less long or the upper ones larger, obtuse, entire, very short-petioled: fls. solitary on short axillary peduncles, mostly nodding, about  $\frac{3}{4}$  in. long, scarlet with the upper one-fourth yellow, the lips less than  $\frac{1}{4}$  in. deep. Brazil.

8. *J. penrhoziensis*, Bailey (*Libonia penrhoziensis*, Lav. *Sericobonia ignea*, Lind. & André). Recorded as a hybrid between *J. pauciflora* and *J. Ghiesbreghtiana*: in character much like the former (No. 7) but lvs. mostly larger and in equal pairs, aperting-acute at apex: fls.  $1\frac{1}{4}$  in. or somewhat more long, bright carmine red with yellow only about the opening, the lips  $\frac{1}{4}$  in. or more deep. Some of the plants passing as *J. pauciflora* belong here.

19. **PACHYSTACHYS**, Nees. About a half-dozen trop. American plants, sometimes referred to Jacobinia, but differing in technical characters of pollen, and otherwise distinguished by the attachment of the stamens in the base of the corolla-tube: fls. yellow or purple, 1-3 in the axil of large bracts in thick head-like thyrses (whence the name *Pachys-tachys*, Greek *thick spike*.)

*P. coccinea*, Nees (*Jacobinia coccinea*, Hiern. *Justicia coccinea*, Aubl.). Strong glabrous shrub, 5-7 ft., the thick sts. constricted above the joints: lvs. ovate or elliptic, to ovate-lanceolate in the small ones, 5-8 in. long, rather short-acuminate, entire, strongly pinnate-veined: fls. scarlet, in dense terminal heads; corolla about 2 in. long, lipped nearly or quite to the middle, upper lip somewhat arched, the lower one reflexed; bracts large, ovate-pointed, entire. S. Amer.

20. **PERISTROPHE**, Nees. Old World trop. herbs and subshrubs, one grown under glass for its free showy bloom; species about 15.—Erect or partially creeping: lvs. entire: fls. solitary or in clusters surrounded by involucre-like bracts mostly longer than the deeply 5-lobed calyx; corolla rose or purple, with slender tube slightly enlarged above, the limb in 2 nearly equal parts and widely expanded, upper lip nearly entire and lower one 3-toothed or -lobed; stamens 2, attached in throat of corolla, the anthers blunt; calyx 5-lobed into equal segms., subtended by calyculate bractlets: caps. ellipsoid, stalked, 4-seeded. (*Peris-trophe*: Greek *belted around*, referring to the involucre.)

Lvs. lanceolate: annual. .... 1. *P. angustifolia*  
Lvs. essentially ovate: perennial, woody. .... 2. *P. speciosa*

1. *P. angustifolia*, Nees. Perhaps annual, grown as such, low, diffuse but erect, much branched, glabrous except near tips: lvs. lanceolate, 2-3 in. long, tapering both ways: fls. few in terminal cymes, light red; involucre of 2 ovate-oblong unequal ciliate bracts. Java.—Grown for the yellow-variegated foliage of the cult. race.

2. *P. speciosa*, Nees. Erect spreading glabrous plant becoming woody at base, 2-3 ft., sts. constricted above the nodes: lvs. ovate, lance-ovate or elliptic, 4-5 in. long, acuminate, entire: fls. violet-purple, 2 or 3 together on slender branches or peduncles, subtended by 2 bract-like lvs.; corolla  $1\frac{1}{4}$ -2 in. across and nearly or quite as long, the 2 stamens exerted over the lower lip; bractlets narrow, widening upward. India.

## 159. MYOPORACEÆ. MYOPORUM FAMILY

Woody plants, mainly natives of Australia but also represented by scattered species in the W. Indies, Japan, China, Hawaiian Isls. and elsewhere; genera 5 and species about 90.—Shrubs or trees, glandular or woolly: lvs. alternate or rarely opposite, simple, entire or rarely toothed: fls. bisexual, regular or irregular, axillary, solitary or fascicled, subsessile or pedicellate; calyx 5-parted or -cleft, persistent; corolla gamopetalous, the limb 5-6-lobed, sometimes bilabiate; stamens 4, didynamous, the fifth represented by a staminode,

epipetalous; ovary superior, 2-celled or falsely 3-10-celled; ovules usually 1-2, rarely 8 in a cell; style 1; stigmas 1-2: fr. drupaceous.—Related to the Scrophulariaceæ and the Verbenaceæ, the distinctive characters being the presence of oil-glands, the few ovules and the pendulous seeds.

Corolla regular or obscurely irregular, predominatingly white.....1. MYOPORUM  
Corolla deeply 2-lipped, prevailing colored.....2. BONTIA

1. **MYOPORUM**, Banks. More or less heath-like shrubs (or sometimes trees), a few grown in a cool greenhouse; species 25-30, Australia, New Zeal., China, Japan, Pacific Isls.—Lvs. alternate, rarely opposite, entire or toothed, with pellucid glands: fls. axillary, usually clustered, small or medium-sized, mostly white; calyx 5-toothed or -parted; corolla regular or nearly so, the tube short and campanulate or longer and funnelform; stamens 4, didynamous, seldom 5; ovary 2-10-celled, each cell 1-2-seeded: fr. a small more or less succulent drupe. (Myop-orum: Greek, referring to the translucent resinous dots on the lvs.)

Corolla white or deep pink.

Plant a tree to 60 ft. high.....1. *M. sandwicense*

Plant a shrub.....2. *M. acuminatum*

Corolla white spotted purple.....3. *M. lætum*

1. ***M. sandwicense***, Gray. BASTARD-SANDALWOOD, from the odor of the wood. NAIO. Tree attaining 60 ft., with dark gray bark deeply and irregularly corrugated: lvs. alternate, crowded toward the ends of the branches, elliptic-lanceolate or oblong-lanceolate, entire or serrate, to 6 in. long, acute or acuminate, often fleshy, viscous when young: fls. white or deep pink, in clusters of 5-8: drupe dry or somewhat fleshy, globose or ovate, white. Hawaiian Isls.

2. ***M. acuminatum***, R. Br. Variable shrub, erect and glabrous: lvs. alternate, elliptic-oblong to lanceolate or linear, to 3 in. long, entire or very few-toothed, somewhat acuminate: fls. in small clusters or solitary, white, the corolla subcampanulate, about  $\frac{1}{2}$  in. long, bearded within, the lobes shorter than the tube: drupe almost globular,  $\frac{1}{4}$  in. or less in diam. Australia.

3. ***M. lætum***, Forst. f. (*M. perforatum*, Hort.). Shrub to 15 ft. or small tree: lvs. lanceolate or obovate-lanceolate, 2-4 in. long, finely serrate above the middle, acute or acuminate, bright green, shining, almost fleshy: fls. 2-6 in a fascicle, white spotted purple,  $\frac{1}{3}$ - $\frac{2}{3}$  in. wide, the rounded lobes hairy inside. New Zeal.

2. **BONTIA**, L. Woody plants with evergreen lvs.; a single species in the W. Indies infrequently cult.—Glabrous tree or shrub: lvs. small, scattered, entire: fls. axillary, solitary or clustered; calyx 5-parted; corolla 2-lipped, pilose within, the lower lip reflexed; stamens didynamous, the lower exserted; ovary 2-celled, 4-ovuled: drupe usually 4-seeded. (Bon-tia: named for Jacob Bontius, physician, born at Leyden, died 1631.)

***B. daphnoides***, L. Ten to 30 ft. high: lvs. lanceolate, 2-4 in. long, acuminate, olive-like: pedicels as long as the fls.; calyx-segms. subulate, ciliate; corolla yellow, variegated with purple, almost 1 in. long: drupe ovate, pointed, about  $\frac{1}{2}$  in. long.

## 160. RUBIACEÆ. MADDER FAMILY

A marked family of about 350 genera and 4,500 species, mainly trop., many of them important economically, yielding dyes and various medicinal and edible products; many genera and species in cult. in N. Amer., mostly in the greenhouse and in the S. for ornament.—Trees, shrubs or herbs: lvs. opposite or whorled, simple, usually entire: fls. bisexual or rarely unisexual, regular or sometimes slightly irregular; calyx 2-6-cleft or lacking; corolla gamopetalous, 4-6-lobed, mostly valvate; stamens 4-6, epipetalous; ovary inferior, 1- to many-, commonly 2-celled; ovules 1 to many in each cell; style 1, stigma 1, capitate or several-branched: fr. a caps., berry or drupe.—Closely related to the Caprifoliaceæ, but usually having stipules or whorled lvs., or a stipular line connecting the opposite lvs.

- A. Number of ovules in each cell 1.  
 B. Plants herbaceous or sometimes shrubby at base.  
 C. Lvs. mostly in whorls of 3 or more.  
 D. Corolla rotate or rotate-campanulate.  
 E. Fls. 5-merous: fr. fleshy..... 1. RUBIA  
 EE. Fls. 4-merous: fr. dry..... 2. GALIUM  
 DD. Corolla funnelform.  
 E. Fls. 4-merous, with or without bracts and without bractlets; style-branches subequal..... 3. ASPERULA  
 EE. Fls. (in ours) 5-merous, bracted and with bractlets; style-branches unequal..... 4. CRUCIANELLA  
 CC. Lvs. opposite..... 5. NERTEA  
 BB. Plants woody, growing to shrubs or small trees.  
 C. Fls. borne in dense globose pedunculate heads..... 6. CEPHALANTHUS  
 CC. Fls. not borne as above.  
 D. Tube of corolla two to three times longer than limb, very slender. 7. IXORA  
 DD. Tube of corolla not as above.  
 E. Corolla salverform: fr. a berry..... 8. COFFEA  
 EE. Corolla funnelform or campanulate: fr. a drupe.  
 F. Lobes of corolla-limb entire or notched, revolute..... 9. COPROSMA  
 FF. Lobes of corolla-limb obtusely 3-lobed..... 10. SERISSA  
 AA. Number of ovules in each cell more than 1.  
 B. Plants twining..... 11. MANETTIA  
 BB. Plants not twining.  
 C. Fr. a caps.  
 D. Seeds winged or appendaged.  
 E. Stamens 4; corolla-lobes 4..... 12. BOUVARDIA  
 EE. Stamens 5; corolla-lobes 5.  
 F. Calyx-lobes deciduous; stamens (in ours) slightly exserted..... 13. LUCULIA  
 FF. Calyx-lobes persistent; stamens included..... 14. CINCHONA  
 DD. Seeds not winged or appendaged.  
 E. Stipules multifid or multi-setose..... 15. PENTAS  
 EE. Stipules triangular.  
 F. Fls. (in ours) white, about 3 in. across..... 16. PORTLANDIA  
 FF. Fls. (in ours) not white, not over 1 in. across..... 17. RONDELETIA  
 CC. Fr. not a caps.  
 D. Stamens mostly 4; corolla-lobes 4 (rarely 5)..... 18. HOFFMANNIA  
 DD. Stamens 5-11; corolla-lobes 5-11.  
 E. Lvs. (in ours) usually in whorls of 3: stamens inserted near base of corolla-tube..... 19. HAMELIA  
 EE. Lvs. (in ours) usually opposite: stamens inserted at throat or mouth of corolla-tube.  
 F. Infl. axillary (very rarely terminal).  
 G. Throat of corolla usually glabrous: fr. sessile..... 20. GARDENIA  
 GG. Throat of corolla hairy: fr. shortly pedicelled..... 21. GENIPA  
 FF. Infl. terminal..... 22. POSOQUERIA

1. **RUBIA**, L. About 40 species in Medit. region, trop. and S. Afr., temp. Asia, trop. and temp. S. Amer., one of economic value.—Perennial herbs, sometimes shrubby at base, frequently rather stiff, hispid or prickly: lvs. in whorls of 4-8 or very rarely opposite: fls. small, in axillary or terminal cymes, 5-merous; involucre none; calyx-tube ovoid or globose, the limb lacking; corolla rotate or slightly campanulate; ovary 2-celled with 1 ovule in each cell, or through abortion 1-celled: fr. fleshy. (Ru-bia: Latin *red*, referring to the color of the dye extracted from the root.)

**R. tinctorum**, L. (*R. tinctoria*, Salisb.). **MADDER**. Climbing herbaceous perennial, the long fleshy roots furnishing a dye: lvs. mostly lanceolate, 2-4 in. long, sessile or very short-petioled, not cordate, in whorls of 4-6, prickly-scabrous on the margins and midrib: cymes terminal, paniced, spreading, leafy. S. Eu. and Orient.

2. **GALIUM**, L. **BEDSTRAW**. Slender herbs, the profuse-flowering species often used in rockeries and flower-beds for their soft and filmy effect, also in bouquets; about 220 species in various parts of the world.—Sts. mostly square, often barbed: lvs. whorled, sessile, without stipules: fls. very small, usually bisexual, epigynous, 4- (rarely 3-) merous, mostly in axillary or terminal panicles; calyx almost or quite obsolete; corolla rotate, deeply 4-parted, the divisions in our species acute or acuminate; stamens 4; ovary 2-celled, with 1 ovule in each cell, forming a 2-lobed, 2-seeded, dry, indehiscent fr., the lobes nearly globular. (Ga-lium: Galion was the name of a plant mentioned by

Dioscorides as used in curdling milk.)—The vernacular name is derived from the old practice of using the plants in the making of beds; LADIES BEDSTRAW, so-called because of the legend that one of these plants was in the hay on which the Mother of Christ rested.

- Fls. yellow: lvs. linear, bristle-tipped. . . . . 1. *G. verum*  
 Fls. white.  
 Lvs. in 4's, lanceolate, several-nerved, not bristle-tipped. . . . . 2. *G. boreale*  
 Lvs. in 8's or 6's, oblanceolate to linear, bristle-tipped. . . . . 3. *G. Mollugo*

1. *G. verum*, L. YELLOW BEDSTRAW. Perennial from a somewhat woody base, glabrous and smooth, or the edges of the lvs. roughish: sts. decumbent or ascending, tufted, 1-3 ft. long: lvs. in 8's or 6's, linear,  $\frac{1}{2}$ -1 in. long, bristle-tipped: panicle ample, its lower branches exceeding the lvs.; fls. yellow, blooming all summer: fr. small, smooth. Eu., now also a weed in fields in E. U. S.

2. *G. boreale*, L. NORTHERN BEDSTRAW. Stoloniferous perennial forming patches: sts. smooth, 1-3 ft. high, erect, strict: lvs. lanceolate,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, not bristle-tipped, mostly in 4's and often with fascicles of smaller ones in the axils: panicle ample; fls. white: fr. usually minutely bristly or becoming glabrous. Que. to Alaska, south to Pa. and Colo.

3. *G. Mollugo*, L. WILD MADDER. WHITE or GREAT HEDGE BEDSTRAW. Perennial, smooth: sts. erect or diffuse, 1-3 ft. long, mostly in clumps: lvs. oblanceolate to linear,  $\frac{1}{2}$ -1 in. long, bristle-tipped, 1-nerved, in whorls of 8 or on the branchlets 6: fls. very numerous in ample almost leafless panicles: fr. smooth or nearly so. (Mollugo: Latin *mollis*, soft, in reference to the delicate lvs.; an herbalist name, employed also in a genus of the Aizoaceæ.) Eu., but a weed in fields in the eastern states.—Known in some places as "Babys-Breath."

3. *ASPERULA*, L. WOODRUFF. Annual and perennial herbs, a few planted in borders and rock-gardens; 80 species, Eu., Asia and Australia.—Sts. square: lvs. whorled (some of the lf.-like organs are really stipules): fls. many, small, mostly 4-merous, produced freely from May to July, without bractlets; corolla funnelform; style-branches subequal; ovules 1 in each cell: fr. leathery, seldom fleshy. (*Asper-ula*: *roughish*, referring to the lvs.)

- Plant perennial: fls. white or pink.  
 Height 6-8 in.: lvs. usually in whorls of 8. . . . . 1. *A. odorata*  
 Height 1-2 ft.: lvs. usually in whorls of 6. . . . . 2. *A. hexaphylla*  
 Plant annual: fls. blue. . . . . 3. *A. orientalis*

1. *A. odorata*, L. SWEET WOODRUFF. Rootstock slender and creeping: st. erect or ascending, 6-8 in. high: lvs. usually in whorls of 8, lanceolate, finely toothed or roughish at the margin, with a hay-like fragrance when dried: corolla white, funnelform with spreading limb: fr. globular, very hispid. Eu. and Orient.

2. *A. hexaphylla*, All. Perennial: st. glabrous, ascending, slender, 1-2 ft. or more high: lvs. in whorls of 6, linear, acute, rough: panicles very loose, the fls. larger than the bracts; corolla tubular-funnelform, white: fr. smooth. Italy, Hungary, Pyrenees.

3. *A. orientalis*, Boiss. & Hohen. (*A. setosa-azurea* and *A. azurea-setosa*, Hort.). Annual 1 ft. high: lvs. in whorls of 8, lanceolate, bristly: fls. blue, longer than the bracts. Eu. and Orient.

4. *CRUCIANELLA*, L. CROSSWORT. About 30 species, native of the Medit. region and W. Asia, one sometimes grown in rock-gardens.—Herbs or half-shrubs: branches usually long, slender, 4-angled: upper lvs. opposite, without stipules; lower lvs. in whorls of 3 or more: fls. small, white, rosy or blue, bracteolate; corolla funnelform, 4-5-lobed; style-branches distinctly unequal: fr. dry. (*Crucianel-la*: Latin *a little cross*, from the arrangement of the lvs.)

*C. stylosa*, Trin. (*Asperula ciliata*, Rochel). Prostrate annual (sometimes grown as a perennial), 6-9 in. high: lvs. in whorls of 8 or 9, lanceolate, hispid: fls. small, 5-merous, crimson-pink, in round terminal heads  $\frac{1}{2}$  in. diam.; style club-shaped, long-exserted, very shortly 2-cleft at apex. June-Aug. Persia.

5. *NERTERA*, Banks & Soland. Low creeping herbs, one grown in the greenhouse or the open in Calif; about 8 species wide-spread in the southern



hemisphere.—Slender perennials: lvs. small, opposite, stalked or sessile, glabrous or somewhat pilose; stipules small: fls. solitary, axillary or terminal, bisexual, inconspicuous, sessile; corolla 4-5-lobed, the tube funnelform-orbicular; stamens 4-5, inserted at the base of the corolla-tube, the anthers exserted; ovary 2-celled: drupe fleshy, 2-seeded. (Nerte-ra: Greek *lowly*, referring to the habit.)

**N. depressa**, Banks & Soland. BEAD-PLANT. Glabrous, variable in size, often forming dense mats: sts. 6-10 in. long, 4-angled: lvs. broadly ovate,  $\frac{1}{2}$  in. long, acute or obtuse, leathery or almost fleshy, the petioles about as long as the blades: fls. greenish: fr. orange-colored, berry-like, about the size of a pea, lasting from midsummer well into the winter. S. Amer., New Zeal., Tasmania.

**6. CEPHALANTHUS**, L. BUTTON-BUSH. Ornamental woody plants of 6 species in Amer. and Asia, of which only 1 N. American species is cult.—Shrubs or small trees with opposite or whorled, entire, stipulate lvs.: fls. small, tubular, white or yellowish, 4-merous, in dense globose pedunculate heads; stamens included, the filaments inserted on the corolla-throat; style long-exserted; ovary 2-celled, each cell 1-ovuled: fr. dry, separating into 2 nutlets. (Cephalanthus: Greek *head* and *flower*; fls. in heads.)

**C. occidentalis**, L. Shrub 3-15 ft. high, glabrous or pubescent: lvs. ovate to lanceolate, 3-6 in. long, with triangular stipules between the petioles: heads about 1 in. diam., long-peduncled, 3 or more at the ends of the branches, in summer; fls. with setiform bractlets between them; calyx often slightly hairy at base. N. Amer.

**7. IXORA**, L. Evergreen shrubs or small trees; upwards of 150 species in trop. regions well around the globe, desirable for greenhouse cult.—Lvs. opposite or whorled: fls. showy, in terminal or axillary usually dense corymbs, white, rose or scarlet; pedicels bracteate; corolla with very long and slender tube, the throat sometimes barbed, the limb 4-5-lobed and wide-spreading; stamens 4-5, inserted on the throat, the filaments short or none; style filiform, exserted, 2-branched; ovary on a fleshy disk, 2-celled, ovules solitary: fr. a hard or fleshy 2-pyrenous berry. (Ixo-ra: a Malabar deity.)—There are many garden forms of *Ixora* under Latin names, these complicating a botanical account of the genus; these forms need special study.

Fls. usually in shades of red (sometimes varying to rose and orange-scarlet).

Corolla-lobes rounded, the tube  $\frac{3}{4}$ -1 in. long.....1. *I. chinensis*

Corolla-lobes acute, the tube 1-1  $\frac{3}{4}$  in. long.....2. *I. coccinea*

Fls. in shades of yellow or orange.

Color of fls. orange-yellow to orange-scarlet.

Corolla-lobes acute.....3. *I. fulgens*

Corolla-lobes rounded.....4. *I. congesta*

Color of fls. pale yellow.....5. *I. lutea*

1. *I. chinensis*, Lam. (*I. coccinea*, Hort., not L.). Glabrous shrub: lvs. obovate or obovate-oblong, 2-4 in. long, sessile or subsessile: fls. in shades of red running into nearly pure white forms, densely corymbed; corolla-tube slender,  $\frac{3}{4}$ -1 in. long, the lobes short and rounded. Malay Archipelago and China.—There are said to be yellowish-fl. forms.

2. *I. coccinea*, L. Much like the preceding but lvs. oblong with mostly rounded or cordate base and sometimes an apiculate tip: corolla-tube 1-1  $\frac{3}{4}$  in. long, the lobes broad and acute. E. Indies.

3. *I. fulgens*, Roxb. Glabrous shrub with erect slender branches: lvs. petioled, linear-oblong to obovate-oblong, to 8 in. long, acute or acuminate, shining above and with 20-30 pairs of sunken nerves: cymes sessile or short-peduncled, corymb-like, large, with slender spreading branches; fls. short-pedicelled, orange-scarlet or orange becoming scarlet; calyx-teeth very short and obtuse; corolla-tube 1  $\frac{3}{4}$  in. or less long, the lobes ovate and acute. India.

4. *I. congesta*, Roxb. Glabrous tree, except the cymes pubescent, stouter than *I. fulgens*: lvs. elliptic or elliptic-oblong, 6-12 in. long, petioled, acute or acuminate, usually coriaceous: cymes sessile or nearly so; fls. sometimes sessile, orange-yellow, changing to reddish, the corolla-segms. rounded. India.

5. *I. lutea*, Hutchinson (*I. coccinea* var. *lutea*, Hort.). Differs from *I. coccinea* in having more lax infl. and pale yellow fls. with larger ovate-rhomboid corolla-lobes. Of garden origin.

8. **COFFEA**, L. Evergreen shrubs or small trees, producing the coffee of commerce, sometimes cult. for ornament; from 25–40 species in trop. Afr. and Asia, the species not yet clearly defined nor well understood horticulturally. —Lvs. mostly opposite, rarely in 3's: fls. in axillary clusters, cream-colored or white; calyx-limb 5- rarely 4-parted; corolla salverform, the throat sometimes villous; stamens inserted in or below the corolla-throat: fr. a berry; seeds 2, horny, the well-known coffee of commerce. (Coffea: from the Arabian name for the drink, itself conjecturally derived from Caffa, a district in S. Abyssinia.)

**C. arabica**, L. COMMON OR ARABIAN COFFEE. Shrub 10–15 ft. high, at first with one main trunk, later with others developing from this; lateral branches horizontal, opposite or very rarely in whorls of 3: lvs. dark glossy green, opposite, rather thin, elliptic, 3–6 in. long, nearly three times as long as broad, more or less abruptly acuminate, the point about  $\frac{1}{2}$  in. long: fls. pure white, star-like, delicately fragrant; corolla-segms. about  $\frac{3}{4}$  in. long, longer than the tube; stigma 2-branched: fr. a 2-seeded deep crimson berry, about  $\frac{1}{2}$  in. long, the seeds known commercially as "berries" or "beans." Trop. Afr., early introduced into Arabia.—Extensively grown in American tropics. A form with variegated lvs. is more showy.

9. **COPROSMA**, Forst. Shrubs or small trees, sometimes planted for their attractive fr. and shining green or variegated lvs.; about 60 species, Australia and New Zeal., extending to Borneo, Hawaii and Juan Fernandez.—Low-spreading or upright, with usually opposite lvs. stalked or nearly sessile: fls. small, solitary or fascicled, white or greenish, usually diœcious; corolla funnel-form or campanulate, lobes 4–5, revolute; stamens 4–5: fr. an ovoid or globose usually 2-celled drupe. (Copro-sma: Greek name, referring to the fetid odor of the plants.)

**C. Baueri**, Endl. Shrub or small tree attaining a height of 20–25 ft.: lvs. thick, shining green, broad-ovate or oblong, 1–3 in. long, obtuse or notched at apex, the margins often revolute: staminate fls. in dense heads on short axillary peduncles; pistillate fls. 3–6, in heads with shorter peduncles, calyx very small, corolla tubular, 4-lobed. (Named probably after the collector.) New Zeal.—Forms with yellow or yellowish-green blotches on the lvs. are in cult.

10. **SERISSA**, Comm. Greenhouse shrub; 1 species in S. E. Asia.—Glabrous or the branches puberulent, fetid when bruised: lvs. rather small, opposite, subsessile; stipules persistent: fls. small, axillary or terminal, solitary or fascicled, white; calyx-tube obconic, limb 4–6-parted, the lobes subulate-lanceolate; corolla funnell-form, tube and throat pilose inside, limb 4–6-lobed, the lobes obtusely 3-lobed; stamens 4–6; ovary 2-celled, with 1 ovule in each cell: fr. subglobose. (Seris-sa: from the Indian name.)

**S. foetida**, Lam. (*S. japonica*, Thunb.). About 2 ft. high: lvs. rather leathery, ovate,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, acuminate (in a var. yellow-margined): fls.  $\frac{1}{4}$  to nearly  $\frac{1}{2}$  in. long. Japan.

11. **MANETTIA**, Mutis (*Lygistum*, P. Br.). Graceful twining plants, sometimes grown for their ornamental fls. either under glass or in warmer parts of the country out-of-doors as roof-plants or on trellises, blooming more or less the year round; perhaps 40 species in warmer parts of Amer.—Evergreen herbs or shrubs, glabrous or villous, weak and climbing: lvs. petioled, opposite or rarely whorled: fls. axillary, solitary or in short corymbs or panicles, white, yellow or red; calyx-lobes 4 or 8, sometimes lf.-like; corolla-limb 4–5-lobed, the lobes usually shorter than the tube, erect or recurved; stamens 4–5, inserted at the mouth or in the throat of the corolla: fr. an obovoid or turbinate, 2-

celled, dehiscent, many-seeded caps. (Manettia: Xavier Manetti, of the botanic garden at Florence, born 1723.)

Calyx-lobes erect or spreading; style exserted.....1. *M. bicolor*  
Calyx-lobes reflexed; style about as long as corolla-tube.....2. *M. inflata*

1. *M. bicolor*, Paxt. Glabrous twiner: lvs. nearly sessile, lanceolate, acuminate, slightly glaucous: fls. solitary, on short axillary pedicels; calyx-lobes erect or spreading; corolla  $\frac{3}{4}$  in. long, somewhat swollen at base, red below and yellow toward the tip, the short lobes spreading-reflexed; style exserted. Brazil.

2. *M. inflata*, Sprague (*M. bicolor*, Hort., in part). Differs from the foregoing in the sts. slightly pubescent, lvs. tomentulose on veins beneath, the leafy reflexed calyx-lobes, corolla more swollen at base and more coarsely hairy, the yellow part much smaller, style (in long-styled plant) about as long as corolla-tube. Paraguay, Uruguay.

12. **BOUVARDIA**, Salisb. Attractive greenhouse plants, once popular as florists' subjects; about 30 species from Tex. and Ariz. to Colombia and southward, chiefly in Mex. and Cent. Amer.—Small shrubs, rarely perennial herbs: lvs. opposite or whorled, stipules subulate: fls. red, yellow or white, showy, in terminal cymes; calyx with 4 persistent lobes; corolla long-tubular or salverform, with 4 spreading lobes; stamens 4, alternate with the corolla-lobes and attached in the tube or throat; styles included or exserted; stigmas 2; ovary 2-celled, many-ovuled: fr. a loculicidal caps. (Bouvardia: Chas. Bouvard, 1572-1658, physician to Louis XIII and superintendent of Royal Gardens in Paris.)—The bouvardias of florists are evergreen derivatives probably not represented by any of the type species.

Fls. in shades of red: lvs. normally in 3's except perhaps on the branchlets.

Corolla pubescent outside.....1. *B. ternifolia*

Corolla glabrous outside.....2. *B. leiantha*

Fls. white: lvs. opposite.....3. *B. Humboldtii*

1. *B. ternifolia*, Schlecht. (*B. triphylla*, Salisb. *B. hirtella*, HBK. *B. Jacquini*, HBK.). Pubescent shrub 2-6 ft. high: lvs. in 3's or 4's, or opposite on the branchlets, lanceolate to ovate, glabrous above: infl. few-fl'd., terminal; fls. red, 1 in. long, pubescent; stamens included: caps. subglobose, with broadly winged dark brown seeds. Mex. to Ariz.—Introduced into England more than 100 years ago. Evidently the most important parent strain for our present hort. kinds although probably not in cult. in its original form.

2. *B. leiantha*, Benth. Much like *B. ternifolia* but more bushy and better grower: sts. hairy: lvs. 3-4 verticillate or sometimes opposite, hairy above: fls. deep red, glabrous outside. Mex. to Costa Rica.—Perhaps a form of the preceding.

3. *B. Humboldtii*, Hort. (Usually catalogued as *B. Humboldtii corymbosa*.) Lvs. opposite, ovate, acuminate: fls. very large, white, fragrant, blooming from summer to winter, in a large terminal cluster.—Probably a derivative of *B. longiflora*, HBK., an opposite-leaved Mexican species with large white fls.

13. **LUCULIA**, Sweet. Two species from the Himalaya and Khasia Mts., grown under glass.—Shrubs with opposite leathery lvs. and deciduous pointed stipules: infl. a terminal corymb, sometimes 1 ft. across, 20-40-fl'd.; calyx-lobes unequal, deciduous; corolla salverform, white or pink, fragrant, the limb with 5 rounded lobes; stamens 5, inserted on the corolla-tube: caps. almost woody, 2-valved, with many winged seeds. (Luculia: probably adapted from a native name.)

*L. gratissima*, Sweet. Ten to 16 ft. high: lvs. ovate-oblong, 4-6 in. long, acuminate, acute at base: fls. pink or rose; corolla-lobes  $1\frac{1}{2}$  in. across, imbricated in the bud; stamens slightly exserted. Temp. Himalaya.—*L. speciosa*, Hort., is apparently a form of this species with large deep-colored fls. and strong growth.

14. **CINCHONA**, L. Plants yielding in the bark quinine, a remedy for malaria; some 30-40 species in the Andean region of S. Amer., several grown commercially in India, Jamaica and Java, and also in Australia and New Zeal.,

one introduced into S. Calif.—Shrubs or seldom trees, glabrous or somewhat tomentose: lvs. opposite, stalked, with stipules between the petioles: fls. rose-color or yellowish-white, in terminal many-fl. panicles; calyx small, 5-toothed, persistent; corolla with long tube and 5 spreading valvate lobes, hairy at the margins; stamens 5, included; ovary 2-celled: caps. opening septicidally from the base upward; seeds small, numerous, flat, surrounded by a wing. (Cincho-na: from the Countess Chinchon, wife of the Spanish viceroy of Peru, who was cured of fever in 1638 by the use of Peruvian bark.)

**C. officinalis**, Hook. f. Lvs. ovate to ovate-lanceolate, acute, shining: fls. silky, rose-colored: caps. elongate.—Sometimes seen (in some of its forms) in collections. Var. **condaminea**, Bailey (*C. condaminea*, Humb. & Bonpl.). Lvs. oblong, acuminate at both ends, glabrous: corolla-limb lanate: caps. ovate, twice as long as wide.

**15. PENTAS**, Benth. Herbs or subshrubs grown under glass; 10 species in trop. and S. Afr. and Madagascar.—Erect or prostrate, hispid or tomentose: lvs. opposite, petioled, stipules multifid or bristly: fls. usually in corymbs; calyx-lobes 4-6, unequal; corolla pilose, the long tube dilated and villous in the throat, the lobes valvate; stamens 4-6, inserted below the throat; disk often produced into a cone after anthesis: caps. membranaceous or leathery, 2-celled, loculicidal; seeds many, minute. (Pen-tas: Greek *five*, referring to the floral parts.)

**P. lanceolata**, Schum. (*P. carnea*, Benth., under which name it is known to gardeners). Erect or decumbent, shrubby at base, 1-2 ft. high, hairy: lvs. ovate, elliptic or lance-oblong, 1-6 in. long,  $\frac{1}{2}$ -2 in. wide, more or less acute, narrowed at base into a short petiole: fls. dimorphic, pale purple, to 1 in. long, nearly sessile, in cymose clusters; corolla very hairy at throat. Trop. Afr., Arabia.—There are several hort. vars. with fls. white, rosy or carmine-rose.

**16. PORTLANDIA**, P. Br. Woody plants with showy fls. grown in the open far S.; 8-10 species in Mex., W. Indies.—Glabrous shrubs or small trees: lvs. opposite, coriaceous, petiolate, the stipules between the petioles connate with them and forming a sheath: fls. large, white or purple, on axillary peduncles; calyx 4-5-lobed, persistent; corolla large, nearly campanulate or funnelform, 5-lobed; stamens 5; ovary 2-celled with many ovules: fr. a leathery obovoid-oblong caps. (Portland-ia: named in honor of the Duchess of Portland.)

**P. platantha**, Hook. Evergreen shrub  $1\frac{1}{2}$ -3 ft. high: lvs. nearly sessile, elliptic-ovate, acute; stipules broadly triangular, obtuse: calyx-lobes 4, lanceolate, leafy, spreading; corolla white, about 3 in. across, broadly funnelform approaching campanulate, with 5 ovate spreading lobes. (Platantha: Greek *broad-fl.*) Probably trop. Amer., but source unknown; a doubtful species botanically.

**17. RONDELETIA**, L. Evergreen shrubs and trees with clusters of large often fragrant fls., a few species grown under glass or out-of-doors in the extreme S.; 60-80 species in trop. Amer.—Lvs. opposite, rarely in 3's, coriaceous or membranaceous: fls. red, yellow or white, in axillary corymbed or paniced or rarely terminal cymes; calyx-lobes equal; corolla-tube usually slender, sometimes swollen, the throat glabrous or bearded; limb 5-lobed or in some species 4-lobed; stamens 4-5; ovary 2-celled, many- (or rarely few-) ovuled: caps. loculicidal. (Rondele-tia: named in memory of Wm. Rondelet, 1507-1566, French physician and naturalist.)

Fls. bright orange-red; corolla-tube slender.....1. *R. odorata*  
Fls. pink to dull red; corolla-tube stout.....2. *R. cordata*

**1. R. odorata**, Jacq. (*R. speciosa*, Lodd.). Shrub to 6 ft. high: lvs. ovate to elliptic or oblong, about 2 in. long, often with revolute margins, shortly petioled; stipules triangular, persistent: fls. bright orange-red with yellow throat, about



$\frac{1}{2}$ in. across, in few- to many-fl'd. terminal cymes; calyx-lobes 5, linear, obtuse, erect; corolla-tube slender, the 5 lobes rounded; stamens included: fr. a globose caps., densely short-pilose; seeds numerous, angulate, yellow. Cuba, Panama.

2. *R. cordata*, Benth. (*R. thyrsiflora*, Hort., not Roth). Shrub 3-7 ft. high: lvs. sessile or nearly so, ovate-oblong to ovate, 3-5 in. long, acute or acuminate, glabrous or nearly so, with oblong-triangular obtuse reflexed stipules: fls. pink or dull red,  $\frac{1}{4}$ in. or less across, short-pedicelled, in dense terminal and axillary corymbose cymes; calyx-lobes 5, obtuse, erect; corolla  $\frac{3}{4}$ in. long, strigillose without, the stout tube with densely yellow-hairy throat: caps. globose,  $\frac{1}{8}$ in. diam., many-seeded. Guatemala.

18. **HOFFMANNIA**, Sw. Herbs or woody plants cult. for their very showy foliage; species above 30 in Cent. and S. Amer.—Branches terete or 4-angled: lvs. opposite or whorled, conspicuously veined, very showy: fls. small, white, yellow or red; corolla tubular, with 4 (rarely 5) oblong or linear obtuse lobes; stamens mostly 4; disk ring-like or cushion-like; ovary 2-3-celled: fr. an oblong or narrow many-seeded berry. (Hoffman-nia: Georg Franz Hoffman, 1760 or 1761-1826, professor of botany at Goettingen.)

Fl.-clusters on long stalks. .... 1. *H. discolor*

Fl.-clusters not on long stalks.

Lvs. oblong-lanceolate. .... 2. *H. Ghiesbreghtii*

Lvs. round-ovate. .... 3. *H. regalis*

1. *H. discolor*, Hemsl. Slightly hairy plant about 6 in. high but drooping over the side of the pot or pan and forming a mat; branches purplish: lvs. short-petioled, oblong-obovate, satiny green above and rich light purple to green beneath: fls. small, red, in long-stalked recurving racemes, on red pedicels. Mex.

2. *H. Ghiesbreghtii*, Hemsl. Subshrub to 4 ft. high, nearly glabrous: st. more or less acutely 4-angled: lvs. oblong-lanceolate, usually 1 ft. or less long, acuminate, very strongly veined, purple-red beneath and dark velvety green above, the short winged petiole somewhat decurrent: fl.-clusters crowded in the axils; fls. yellow, with a red spot in the center. Mex., collected by Ghiesbreght.—A hort. form has handsomely mottled lvs.

3. *H. regalis*, Hemsl. Strong-growing glabrous subshrub, the branches obtusely 4-angled and somewhat fleshy: lvs. large, round-ovate, abruptly acuminate, plicate with arched nerves, purple-red beneath and dark rich green above: fl.-clusters crowded in the axils; fls. yellow, sessile. Mex.

19. **HAMELIA**, Jacq. About 13 species, by some reduced to 6, in trop. and subtrop. Amer., one grown in the greenhouse or out-of-doors in the extreme S.—Evergreen upright shrubs with herbaceous shoots: lvs. membranaceous, entire, opposite or sometimes in whorls, petioled, with interpetiolar stipules: fls. short-stalked or sessile, in terminal forking cymes; calyx with 5 short erect persistent lobes; corolla tubular or subcampanulate, contracted at base, the limb with 5 short lobes; stamens 5, the filaments connate below and inserted near base of corolla-tube; ovary 5-celled: fr. a small ovoid or globose berry with numerous minute seeds. (Hame-lia: Henry Louis Duhamel du Monceau, 1700-1782, prominent French botanical author.)

*H. patens*, Jacq. (*H. erecta*, Jacq.). To 12 ft. high, cinereous-pubescent on all young parts: lvs. usually in whorls of 3, elliptic-ovate to oblong, 3-6 in. long, acute or acuminate, petiolate: fls. scarlet-orange, almost sessile along the branches of the 3-5-rayed cyme; calyx-segms. short, triangular; corolla with narrowly cylindric tube about  $\frac{3}{4}$ in. long: fr. black, ovoid,  $\frac{1}{4}$ in. long. Summer. Fla. to Brazil.

20. **GARDENIA**, Ellis. One species planted in the open in the S. and as a florists' plant N.; species about 60 in subtrop. regions of the eastern hemisphere.—Glabrous, pubescent or even tomentose shrubs or rarely small trees: lvs. opposite or in 3's, with interpetiolar stipules: fls. large, yellow or white, axillary and solitary or sometimes corymbose; calyx-tube ovoid or obconic, the limb lobed or parted, persistent; corolla salverform or tubular, the tube much exceeding the calyx, the limb with 5-11 spreading or recurved contorted

lobes; stamens 5-9, inserted on the corolla-throat: fr. leathery or fleshy, sessile, sometimes breaking open irregularly. (Gardenia: after Alexander Garden, physician of Charleston, S. C., a correspondent of Linnæus.)

**G. jasminoides**, Ellis (*G. florida*, L. *Warneria* or *Varneria augusta*, Stickm. *Gardenia augusta*, Merr.). CAPE-JASMINE. Variable shrub, 2-6 ft. high, the st. sometimes rooting: lvs. lanceolate to obovate, to 4 in. long, short-acuminate, thick, evergreen, sometimes variegated: fls. large, often double, waxy, camellia-like, fragrant; calyx ribbed, with 5 long teeth; corolla-tube cylindric, the throat glabrous. China.—Var. **Fortuniana**, Lindl. (*G. Fortunei*, Hort.). Larger-fl. form; presumably the *G. Veitchii* of gardens belongs here.

**21. GENIPA**, L. A W Indian genus of 3-4 species, one furnishing edible fr.—Trees or shrubs: lvs. opposite, shortly petioled or sessile, large, leathery, shining; stipules interpetiolar, deciduous: cymes axillary or terminal, few-fl.; fls. white to yellowish, large; calyx campanulate, truncate or 5-6-toothed, persistent; corolla salverform, the limb twisted to the left, 5-6-parted; stamens 5-6, inserted at the top of the corolla-tube; ovary 1-2-celled: fr. a large subglobose edible berry with numerous seeds. (Genipa: Brazilian name.)

**G. americana**, L. Tree to 60 ft. high: lvs. obovate to oblong, to 1 ft. long, glabrous: pedicels shorter than the calyx; calyx truncate or shallowly crenate; corolla silky, white or light yellow, about 1 in. across, the 5-6 lobes obtuse, the throat villous: berry russet-brown, about 2½ in. diam., smooth or sparsely tuberculate, glabrous or short-pilose; seeds irregular, thick, nearly ½ in. long, dark brown.—The fr. is largely used in trop. Amer., as a preserve under the name "Genipop"; sometimes called "Marmalade-Box."

**22. POSOQUERIA**, Aubl. Shrubs or small trees, sometimes grown under glass or in the far S. out-of-doors, for their glossy foliage and fragrant fls.; about 15 species in trop. Amer.—Branches terete, glabrous: lvs. opposite, short-petioled, coriaceous, entire; stipules interpetiolar, rather large, deciduous: fls. fragrant, white, rose or scarlet, in many-fl. terminal corymbs; calyx-limb 5-toothed, persistent; corolla with long slender tube, scarcely dilated at throat, the limb with 5 obtuse subequal lobes, somewhat contorted; stamens 5, inserted at the mouth of the corolla; ovary 1-2-celled: berry ovoid, fleshy, rather large, few- to many-seeded. (Posoqueria: from a native name in Guiana.)

**P. latifolia**, Roem. & Schult. (*Oxyanthus isthmia*, Hort.). Large shrub of erect habit: lvs. large, ovate, shortly acuminate, obtuse or subcordate at base: calyx-teeth acute or obtuse; corolla white, the tube 4 in. long, and about ½ in. diam., the limb abruptly spreading and about 1 in. across. Mex. to Bolivia and Brazil.

## 161. CAPRIFOLIACEÆ. HONEYSUCKLE FAMILY

A family consisting largely of woody plants, many of which are cult. in N. Amer. for ornamental purposes, a few for their medicinal properties; genera 11 and species about 350, distributed principally in the north temp. zone, a few in the mts. of the tropics.—Shrubs or very rarely herbs: lvs. opposite, simple or pinnate, mostly without stipules: fls. bisexual, regular or irregular; calyx 4-5-toothed or 4-5-fid, the tube adnate to the ovary; corolla gamopetalous, 4-5-lobed, tubular or rotate; stamens as many as lobes of corolla and alternate with them, epipetalous; ovary inferior, 1-5-celled, each cell 1- to many-ovuled; style 1 or obsolete; stigmas 1-5: fr. a berry or caps.—The Twin-Flower, *Linnæa borealis*, L., of Eu. and *L. americana*, Forbes, of N. Amer., are sometimes planted; they are choice evergreen ground-creepers, with 2 nodding rose-colored or white fragrant flowers terminating peduncles a few inches high: in the European species the corolla is bell-shaped and in the American tubular at base. *C*, *D*, *E*, *F*, Fig. 13, page 684.

Corolla rotate or nearly so, the limb regular; style short, 3-5-lobed.

Lvs. pinnately cut.....1. *SAMBUCUS*

Lvs. simple.....2. *VIBURNUM*

Corolla tubular or bell-shaped, the limb usually irregular; style long, mostly with capitate stigma.

Fr. a berry.

Ovary 5-8-celled.....3. *LEYCESTERIA*

Ovary 2-4- (rarely 5-) celled.

Shape of corolla regular; ovary 4-celled, 2 of the cells sterile:

fr. a berry-like drupe with 2 nutlets.....4. *SYMPHORICARPOS*

Shape of corolla commonly more or less irregular; ovary 2-3-

celled: fr. a few-several-seeded berry.....5. *LONICERA*

Fr. an achene or caps.

Stamens 4, paired; fr. a 1-seeded leathery achene.....6. *ABELIA*

Stamens 5; fr. a 2-valved caps. with numerous seeds.....7. *DIERVILLA*

1. **SAMBUCUS**, L. **ELDER**. About 20 species in the temp. and subtemp. regions of both hemispheres, furnishing ornamental subjects.—Large and rather coarse shrubs or small trees, rarely perennial herbs, some spreading by suckers, the vigorous shoots with large pith: lvs. opposite, odd-pinnate, the lfts. serrate, with or without stipules and stipels: fls. small, usually bisexual and 5-merous, in terminal compound cymes or panicles; calyx-lobes minute; corolla rotate or nearly so; stamens as many as the corolla-lobes, the filaments short; ovary 3-5-celled; style short, 3-5-lobed: fr. a small drupe with 3-5 cartilaginous nutlets. (*Sambu-cus*: old Latin name for the elder.)

Berries black or dark purple, rarely green or white: pith white: cymes flat.

Branches strongly lenticellate: lfts. usually 5.....1. *S. nigra*

Branches slightly lenticellate: lfts. usually 7.....2. *S. canadensis*

Berries red, rarely yellow: pith light brown: cymes convex or paniculate.....3. *S. racemosa*

1. ***S. nigra***, L. **EUROPEAN ELDER**. Shrub or tree to 30 ft., with deeply furrowed bark and gray strongly lenticellate branches: lvs. dark green; lfts. 3-7, usually 5, elliptic or ovate, 2-6 in. long, acute or acuminate, serrate, with a short petiolule, usually pubescent beneath while young: fls. yellowish or dull white, with a heavy odor, produced in late spring and early summer in flat 5-rayed cymes 5-8 in. across: berries globose, shining black, 3-celled,  $\frac{1}{4}$ - $\frac{1}{2}$  in. diam., ripe in Sept. Eu.—Columnar sts., pendulous or prostrate branches, lvs. variously cut or dissected, spotted or dotted with white, or wholly golden-yellow, and pale green fr. are found in the numerous vars. and forms in cult.

2. ***S. canadensis***, L. **AMERICAN or SWEET ELDER**. Stoloniferous shrub to 12 ft., with white pith and pale yellowish-gray slightly lenticellate branches: lvs. bright green; lfts. usually 7, elliptic to lanceolate, 2-5 in. long, acute or acuminate, sharply toothed, on short petiolules, the lowest pair frequently 2-3-lobed, the lower surface smooth or slightly downy: fls. white, produced in June-July in 5-rayed cymes to 10 in. across: berries purplish-black, usually 4-celled, about  $\frac{1}{4}$  in. diam., in Sept. N. S. and Man. to Fla. and Tex.—Cult. vars. occur with lvs. variously cut or colored or with red or greenish berries.

3. ***S. racemosa***, L. **RED-BERRIED ELDER**. Shrub to 12 ft. high, with branches and pith light brown and young branchlets glabrous or nearly so: lfts. 5, oval or ovate, 2-4 in. long, acuminate, sharply and regularly toothed, glabrous: infl. a dense terminal pyramidal panicle  $1\frac{1}{2}$ -3 in. high and scarcely as wide; fls. yellowish-white, blooming in spring: berries scarlet, 3-seeded,  $\frac{1}{4}$  in. across, in summer. Eu. to E. Asia.—***S. pubens***, Michx., by many authorities regarded as a var. of *S. racemosa*, is distinguished by its downy young shoots, lvs. and fl.-stalks, its brown pith and its less dense fr.-panicles. Wild over much of N. Amer.

2. **VIBURNUM**, L. Attractive and popular ornamental shrubs; about 120 species in N. and Cent. Amer. and in the Old World from Eu. and N. Afr. to E. Asia, distributed as far south as Java.—Upright mostly rather large shrubs or rarely small trees, the foliage mostly deciduous and assuming a bright fall coloring, or sometimes evergreen: lvs. opposite, simple, medium-sized, with or without stipules: fls. small, in terminal paniculate or mostly umbel-like cymes, the marginal fls. sterile and radiate in several species; calyx with 5 minute teeth; corolla rotate or campanulate, rarely tubular; stamens 5; ovary

usually 1-celled: fr. a drupe with a 1-seeded commonly compressed stone. (Vibur-num: ancient Latin name.)

- A. Lvs. penninerved, not lobed.
- B. Secondary veins of lf. curving and anastomosing before reaching the margin; lf.-margin entire or rather finely serrate or toothed.
- C. Infl. and often the lvs. and young branches conspicuously stellate-pubescent.
  - D. Lf. entire or nearly so.
    - E. Fls.  $\frac{1}{2}$  in. diam.: lvs. strongly rugose above..... 1. *V. rhytidophyllum*
    - EE. Fls.  $\frac{1}{2}$ – $\frac{1}{2}$  in. diam.: lvs. not rugose..... 2. *V. utile*
  - DD. Lf. crenate or toothed.
    - E. Fls. in dense semiglobose panicles not over 1  $\frac{1}{2}$  in. diam., all alike and bisexual; corolla with cylindric tube twice as long as limb..... 3. *V. suspensum*
    - EE. Fls. in cymes 3–5 in. across, the marginal ones enlarged and sterile; corolla rotate..... 4. *V. macrocephalum*
  - CC. Infl., lvs. and young branches not stellate-pubescent, commonly glabrous or nearly so.
    - D. Foliage evergreen, entire or remotely serrate.
      - E. Cyme paniculate, broadly pyramidal; lf.-margin plane.... 5. *V. odoratissimum*
      - EE. Cyme umbel-like, flat-topped; lf.-margin usually revolute... 6. *V. Tinus*
    - DD. Foliage deciduous or half evergreen, usually more or less toothed or serrate.
      - E. Lf.-margin entire or slightly undulate-dentate: cymes peduncled.
        - F. Peduncle as long as or longer than cyme: lvs. usually entire..... 7. *V. nudum*
        - FF. Peduncle shorter than cyme: lvs. remotely denticulate... 8. *V. cassinoides*
      - EE. Lf.-margin finely and sharply serrate: cymes sessile, subtended by the upper lvs.
        - F. Petioles mostly with wavy rather broad margin: lvs. acuminate..... 9. *V. Lentago*
        - FF. Petioles without or with narrow not wavy margin: lvs. acute or obtuse..... 10. *V. prunifolium*
  - BB. Secondary veins prominent to margin, ending in the points of the teeth.
    - C. Winter-buds naked: lvs. with usually numerous small teeth.
      - D. Corolla with cylindric tube..... 11. *V. Carlesii*
    - DD. Corolla rotate-campanulate.
      - E. Cymes with all the fls. fertile and alike..... 12. *V. Lantana*
      - EE. Cymes with marginal fls. sterile and enlarged..... 13. *V. alnifolium*
    - CC. Winter-buds protected by scales: lvs. with rather coarse teeth, usually less than 25 on each side.
      - D. Stipules absent.
        - E. Cymes with marginal fls. sterile and enlarged..... 14. *V. tomentosum*
        - EE. Cymes with all fls. fertile and alike.
          - F. Fr. red: lvs. rounded or broadly cuneate at base.
            - G. Foliage evergreen, glabrous..... 15. *V. japonicum*
            - GG. Foliage deciduous, pubescent..... 16. *V. dilatatum*
          - FF. Fr. bluish-black.
            - G. Base of lvs. narrowed..... 17. *V. Sieboldi*
            - GG. Base of lvs. cordate or rounded.
              - H. Petioles glabrous..... 18. *V. dentatum*
              - HH. Petioles hairy..... 19. *V. pubescens*
    - DD. Stipules present.
      - E. Bark exfoliating: lvs. broadly ovate, 3–5 in. long, long-petioled..... 20. *V. molle*
      - EE. Bark close: lvs. ovate, 1  $\frac{1}{2}$ –3 in. long, usually short-petioled..... 21. *V. affine*
  - AA. Lvs. palmately 3–5-nerved, usually 3-lobed, slender-petioled.
    - B. Fls. all fertile: fr. oval, red changing to purple-black..... 22. *V. acerifolium*
    - BB. Fls. of the margin sterile, ray-like: fr. subglobose, usually scarlet.
      - C. Petiole with a narrow groove and large disk-like glands; lvs. pubescent beneath..... 23. *V. Opulus*
      - CC. Petiole with a broad shallow groove and small glands; lvs. glabrous beneath or pubescent only on veins..... 24. *V. trilobum*

1. *V. rhytidophyllum*, Hemsl. Shrub, with stout upright branches and evergreen lvs., to 10 ft.; branchlets densely stellate-tomentose: lvs. ovate-oblong to oblong-lanceolate, 3–7  $\frac{1}{2}$  in. long, entire or slightly denticulate, acute or obtuse, rounded or subcordate at base, stout-petioled, the upper surface dark green and glabrous, lustrous, deeply wrinkled, the lower surface reticulate and covered with thick gray or yellowish stellate tomentum: cymes terminal, 4–8 in. across; fls. yellowish-white, about  $\frac{1}{4}$  in. diam., the buds forming in autumn and remaining exposed all winter and expanding the following May and June: fr. ovoid,  $\frac{1}{3}$  in. long, red changing to black, ripe Sept., Oct. Cent. and W. China.



2. *V. utile*, Hemsl. Evergreen shrub, openly branched, to 6 ft.; branches slender, at first covered with stellate pubescence: lvs. narrowly ovate or nearly oblong, 1-3 in. long, entire, the apex tapering but bluntish, glabrous and glossy green above, beneath prominently veined and white with dense stellate tomentum: infl. with stellate-downy branches; fls. all bisexual, produced during spring in dense rounded terminal clusters 3 in. across: fr. blue-black, oval,  $\frac{1}{4}$  in. long. China.

3. *V. suspensum*, Lindl. (*V. Sandankwa*, Hassk.). Evergreen shrub reaching 6 ft., the slender branches appearing warty due to the conspicuous lenticels; branches and infl. stellate-pubescent: lvs. oval or oval-oblong, 2-4 in. long, acute or somewhat obtuse, usually crenate-serrate toward the apex, shining and dark green above, paler beneath, glabrous: fls. white, tinged pink, summer-blooming, the dense semi-globose panicles becoming  $1\frac{1}{2}$  in. across; corolla  $\frac{3}{8}$ - $\frac{1}{2}$  in. long, with cylindric tube twice as long as limb: fr. red, subglobose. Liu-kiu Isl.

4. *V. macrocephalum*, Fortune. Deciduous or semi-evergreen shrub to 12 ft. or more, with spreading branches, the young shoots densely stellate-pubescent: lvs. oval to ovate-oblong, 2-4 in. long, denticulate, rounded at base, short-petioled, acute or rounded at apex, dark green and sparsely stellate-pubescent above, densely stellate-pubescent beneath: cymes peduncled, 3-5 in. across; fls. pure white, the marginal ones sterile and radiate,  $\frac{3}{4}$ -1 in. across. Late spring and early summer. China.—Var. *sterile*, Dipp. (*V. Fortunei*, Hort. *V. macrophyllum*, Hort.), known as Chinese Snowball, has all the fls. sterile and radiate, forming a subglobose ball sometimes 7-8 in. across.

5. *V. odoratissimum*, Ker (*V. Awabucki* and *V. Awafuki*, Hort.). Glabrous evergreen shrub to 10 ft., with stout warty branches: lvs. elliptic to elliptic-oblong, 3-6 in. long, acute, remotely serrate toward the apex or entire, bright glossy green above, paler beneath: fls. pure white, fragrant, produced in late spring and early summer, in broadly pyramidal panicles 4 in. high; corolla rotate-campanulate: fr. red, changing to black. India to S. China and Japan.

6. *V. Tinus*, L. (*V. Laurustinus*, Hort.). LAURESTINUS. Much-branched evergreen shrub to 10 ft., often cult. as a pot-plant, N., the branches glabrous or somewhat hairy: lvs. ovate-oblong or oblong, 2-3 in. long, entire and usually revolute at margins, acute, glossy dark green and glabrous above, commonly pubescent only on the veins beneath: cymes somewhat convex, 2-3 in. broad; fls. white or pinkish-white, slightly fragrant,  $\frac{1}{4}$ - $\frac{3}{8}$  in. across, the corolla-limb longer than the tube: fr. ovoid, black, rather dry. Fls. all summer or in the greenhouse in winter and early spring. (Tinus: pre-Linnæan name for the plant.) Medit. region.—Vars. are offered with purplish fls. or with lvs. varying in color, shape or pubescence.

7. *V. nudum*, L. (*V. nudum* var. *Claytoni*, Torr. & Gray). SMOOTH WITHE-ROD. Deciduous shrub to 15 ft. high: lvs. oval to obovate or oval-lanceolate, 3-9 in. long, acute or obtuse, mostly entire and somewhat revolute or obscurely crenulate, scurfy on both sides when young, becoming glabrous above: cymes rather long-peduncled, 3-5 in. broad; fls. white or yellowish-white, in summer: fr. globose, pink at first, changing to dark blue. L. I. to Fla., west to Ky. and La.

8. *V. cassinoides*, L. (*V. nudum* var. *cassinoides*, Torr. & Gray). WITHE-ROD. Deciduous shrub attaining 12 ft. high: lvs. oval to ovate, 1-3 in. long, acute or bluntly acuminate, cuneate or rounded at base, usually obscurely dentate, nearly glabrous, rather thick, dull green above: fls. and fr. similar to those of the preceding species, but the peduncles usually shorter than the cyme. Summer. Newf. to Man. and Minn., south to N. C.

9. *V. Lentago*, L. SHEEP-BERRY. NANNY-BERRY. Slender-branched deciduous shrub or small tree to 30 ft. high, with long-pointed winter-buds: lvs. ovate, 2-4 in. long, acuminate, finely and sharply serrate, glabrous or scurfy on the veins beneath; petioles mostly with wavy margin: cymes sessile, many-fld., 2-5 in. broad; fls. white, in late spring and early summer: fr. oval, bluish-black, bloomy, remaining until spring. (Lentago: same as Lantana, an old name once applied to Viburnum.) Hudson Bay to Man., south to Ga. and Miss.

10. *V. prunifolium*, L. (*V. pyrifolium*, Poir.). BLACK-HAW. STAG-BUSH. Spreading deciduous shrub or small tree to 15 ft., high, with short-pointed glabrous or reddish-pubescent winter-buds: lvs. roundish to ovate or oval, 1-3 in. long, finely and sharply serrate, acute or obtuse, glabrous or nearly so; petioles often with narrow entire margins, glabrous or rusty-tomentose: cymes sessile, 2-4 in. broad; fls. pure white,  $\frac{1}{4}$  in. across, produced in spring and early summer: fr. oval to subglobose, bluish-black, glaucous, about  $\frac{1}{2}$  in. long. Conn. to Fla. west to Mich. and Tex.

11. *V. Carlesii*, Hemsl. Deciduous much-branched spreading shrub reaching 4 ft. in height; young branchlets stellate-tomentose: lvs. broadly ovate or oval, 1-3½ in. long, acute, commonly rounded at base, short-petioled, irregularly toothed, dull green above, pale beneath, stellate-pubescent on both surfaces: fls. salverform, about ½ in. long and with limb as wide, fragrant, changing from pinkish to white, in dense subglobose terminal cymes 2-3 in. across, appearing in spring with the lvs. (Named after Carles, the collector of this species.) Korea.

12. *V. Lantana*, L. WAYFARING-TREE. Deciduous shrub to 20 ft., or sometimes tree-like, with young branches scurfy-pubescent: lvs. ovate to ovate-oblong, 2-4 in. long, acute or obtuse, cordate at base, minutely toothed, slightly stellate-pubescent and wrinkled above, stellate-tomentose beneath: fls. white, ¼ in. across, uniform and bisexual, produced in late spring and early summer, in peduncled usually 7-rayed cymes 2-3 in. broad: fr. ovoid-oblong, bright red, changing to almost black. (Lantana: old name once applied to *Viburnum*.) Eu., W. Asia.—There is a var. with larger very wrinkled lvs. and larger cymes; also a number of other vars., some with variegated lvs.

13. *V. alnifolium*, Marsh. (*V. lantanoides*, Michx.). HOBBLE-BUSH. AMERICAN WAYFARING-TREE. Deciduous bushy shrub to 10 ft. high, the wide-spreading often procumbent branches scurfy-pubescent when young: lvs. orbicular or broadly ovate, 3-8 in. broad, acute or short-acuminate, cordate at base, irregularly serrate, nearly glabrous above, scurfy and stellate-pubescent beneath especially on the veins, turning deep claret-red in autumn: cymes sessile, 3-5 in. broad: fls. white, the marginal ones enlarged (often 1 in. across) and sterile, on long pedicels: fr. ovoid-oblong, dark purple. Late spring and early summer. N. B. and Mich. to N. C.—There is an earlier-flowering var.

14. *V. tomentosum*, Thunb. (*V. plicatum*, Miq.). Bushy shrub to 10 ft., deciduous, the spreading branches tomentose when young: lvs. broadly ovate to oblong-ovate, sometimes obovate, 1½-4 in. long, acute or abruptly acuminate, rounded or cuneate at base, dentate-serrate, dark green and nearly glabrous above, stellate-pubescent beneath, at least on the veins: infl. a flat umbel-like cyme, long-peduncled, 2½-4 in. across; marginal fls. white, sterile, long-pedicelled, 1-1½ in. across, more or less irregular: fr. ovoid, red, changing to bluish-black. Summer. China, Japan.—Vars. are offered with lvs. rotund, oblong or lanceolate, sometimes variegated, also with fewer sterile fls., or the Japanese Snowball, var. *plenum*, Rehd., with all the fls. sterile.

15. *V. japonicum*, Spreng. (*V. macrophyllum*, Blume). JAPANESE VIBURNUM. Upright evergreen glabrous shrub to 6 ft. high: lvs. leathery, ovate, rotund, oval or obovate, 3-6 in. long, acute or short-acuminate, rounded or broadly cuneate at base, remotely dentate except at base: cymes short-peduncled, glabrous, 2-4 in. broad; fls. white, very fragrant, bisexual, uniform, produced in summer: fr. globose, red, ½ in. long. Japan.

16. *V. dilatatum*, Thunb. Deciduous shrub to 10 ft. high, with erect sts. and branches pubescent when young: lvs. roundish or broadly ovate or obovate, 2-5 in. long, usually abruptly short-acuminate, rounded or broadly cuneate at base, saliently toothed, somewhat hairy on either side: cymes stalked, mostly 5-rayed, 3-5 in. across; fls. white, the corolla pubescent outside: fr. ovate, scarlet, ½ in. long, numerous, remaining a long time on the branches. Late spring and early summer. China, Japan.

17. *V. Sieboldi*, Miq. (*V. reticulatum*, Hort.). Stout shrub to 10 ft. high, with young branches pubescent and deciduous foliage exhaling disagreeable odor when bruised: lvs. oval or oblong-obovate, 3-6 in. long, coarsely crenate-serrate except toward the base, acute or rounded at apex, narrowed at base, glossy dark green above, paler and stellate-pubescent beneath: fls. creamy-white, rotate-campanulate, in panicles 2½-4 in. broad, blooming in late spring or early summer: fr. oblong, changing from pink to bluish-black, dropping soon after ripening. (P. F. von Siebold, page 87.) Japan.—There is a smaller less pubescent var., also one with variegated lvs.

18. *V. dentatum*, L. ARROW-WOOD. Nearly glabrous deciduous shrub to 15 ft. high: lvs. broadly ovate or rotund, 1½-3 in. long, acute or short-acuminate, rounded or cordate at base, coarsely toothed, pubescent only in the axils of the veins beneath: cymes umbel-like, long-peduncled, 2-3 in. broad; fls. uniform, bisexual, white, ½ in. across: fr. subglobose, bluish-black, glaucous. Late spring and early summer; fr. in Oct. N. B. to Minn., south to Ga.

19. *V. pubescens*, Pursh (*V. venosum*, Britt. *V. nepalense*, Hort.). Deciduous shrub to 12 ft., young branches and petioles stellate-pubescent: lvs. ovate to rotund,

2-5 in. long, acute or acuminate, rounded or heart-shaped at base, coarsely and sharply toothed, glabrous or nearly so above, stellate-pubescent beneath particularly on the veins and in their axils: cyme long-stalked,  $2\frac{1}{2}$  4 in. across, stellate-pubescent; fls. white, bisexual and uniform,  $\frac{1}{2}$  in. wide: fr. blue, globose or roundish-oval,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long. Summer; fr. in Sept. Mass. to Va.—Several vars. are offered whose lvs. differ somewhat from the type in size or form and whose cymes are larger or earlier blooming.

20. *V. molle*, Michx. Deciduous bushy shrub to 12 ft.; older bark separating in thin flakes and peeling off: lvs. broadly ovate to rotund, 3-5 in. long, short-acuminate, mostly cordate at base, long-petioled, stipulate, coarsely dentate, glabrous above, more or less pubescent beneath: cymes long-peduncled, finely pubescent, about  $2\frac{1}{2}$  in. broad; fls. white, bisexual,  $\frac{1}{4}$  in. across, opening in spring: fr. oval, bluish-black, scarcely  $\frac{1}{2}$  in. long, ripe in Aug. Ky., Mo., Ia.

21. *V. affine*, Bush (*V. pubescens*, Auth., not Pursh). Compact bushy shrub 3-6 ft. high, deciduous, with slender upright branches and close bark: lvs. ovate to rotund-ovate,  $1\frac{1}{2}$ -3 in. long, acute or acuminate, rounded or cordate at base, coarsely toothed, nearly glabrous above, pubescent beneath only on the veins; petioles very short, with slender stipules at base: cymes short-peduncled, dense,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. broad; fls. white,  $\frac{1}{4}$  in. across, exserted: fr. oval, slightly flattened, almost black, sweet and edible. New England to Ga., west to Man. and Mo. — Var. *hypomalacum*, Blake, has lvs. densely pilose beneath, and does not range so far west.

22. *V. acerifolium*, L. DOCKMACKIE. Deciduous shrub to 5 ft., the slender upright branches downy at first becoming glabrate: lvs. maple-like, 3-lobed, 2-5 in. long, coarsely dentate-serrate, with acuminate lobes, pubescent or at length almost glabrous, turning dark purple in autumn: fls. white,  $\frac{1}{2}$  in. diam., uniform and bisexual, produced during early summer in terminal long-stalked cymes 2-3 in. across: fr. oval,  $\frac{1}{2}$  in. long, red changing to purple-black. N. B. to Minn. south to N. C.

23. *V. Opulus*, L. EUROPEAN CRANBERRY-BUSH. Deciduous shrub to 12 ft. high, with smooth light gray sts. and branches: lvs. maple-like, 2-4 in. long, with 3 (sometimes 4-5) acuminate lobes, coarsely and irregularly toothed, pubescent beneath; petioles  $\frac{1}{2}$  1 in. long, with 2 narrow stipules near base and glands near lf.-blade: cymes 3-4 in. across, peduncled, with a border of sterile showy white fls.  $\frac{3}{4}$  in. diam., the center composed of small fertile fls.; stamens exserted, the anthers yellow: fr. subglobose, scarlet,  $\frac{1}{2}$  in. diam. Fls. early summer; fr. late summer. (*Opulus*: same as *Populus*). Eu., N. Afr., N. Asia.—The var. known as Guelder Rose or Snowball, var. *sterile*, DC., has all fls. sterile, forming large globose heads. There are also variegated strains, and one yellow-fruited var.

24. *V. trilobum*, Marsh. (*V. americanum*, Auth.). CRANBERRY-BUSH. HIGH-CRANBERRY. More open and spreading than *V. Opulus*: lvs. 2-5 in. long, lobes coarsely toothed or nearly entire, pubescent on the veins beneath or nearly glabrous; petioles with shallow groove and small usually stalked glands: cymes with shorter peduncles; fls. produced in early summer; stamens somewhat shorter: fr. bright scarlet, beginning to color by the end of July and keeping their color till the following spring. N. B. to B. C. south to N. J. and Ore.

3. *LEYCESTERIA*, Wall. Deciduous shrubs cult. in warm regions; species about 4, Himalayan and Chinese.—Lvs. opposite, simple, with very small or no stipules: fls. in erect or drooping verticillate leafy-bracted spikes; calyx persistent, unequally 5-lobed; corolla funnelform, nearly equally 5-lobed and swollen at base; stamens 5, inserted on the corolla-tube; ovary 5-8-celled, the stigma capitate: fr. a berry. (*Leycesteria*: Wm. Leycester, judge in Bengal.)

*L. formosa*, Wall. (*L. elegans*, Hort.). HIMALAYA-HONEYSUCKLE. Vigorous shrub attaining 6 ft.; branches hollow: lvs. broadly ovate to ovate-lanceolate, 2-5 in. long, long-acuminate, cordate at base, entire or finely toothed, glabrous or finely puberulent beneath: spikes drooping; fls. purplish, each whorl subtended by claret-colored leafy bracts which persist until the fr. is ripe: fr. dark red, subglobose, about  $\frac{1}{2}$  in. long, in autumn. Himalayas, 5,000-10,000 ft., to W. China.—There is a var. with variegated foliage and one with rose-colored fls.

4. *SYMPHORICARPOS*, Ludw. About 15 species of deciduous ornamental shrubs, native in N. Amer. south to Mex. and 1 in W. China; many of the American species are very closely related and difficult to distinguish.—

Lvs. opposite, simple, entire or sometimes sinuately toothed or lobed, exstipulate; fls. short-pedicelled, in terminal or axillary clusters or spikes or sometimes solitary; calyx 4-5-toothed; corolla campanulate or salverform, 4-5-lobed, nearly regular; stamens as many as the corolla-lobes, included or somewhat exserted; style slender; stigma capitate; ovary with 2 fertile and 2 sterile cells; fr. a berry-like drupe with 2 nutlets. (Symphoricar-pos: Greek to bear together and fruit, referring to the clustered frs.)

- Fr. red.....1. *S. orbiculatus*  
 Fr. white or pinkish.  
 Style and stamens exserted.....2. *S. occidentalis*  
 Style and stamens included.  
 Plant upright.....3. *S. albus*  
 Plant diffuse or procumbent.....4. *S. acutus*

1. *S. orbiculatus*, Moench (*S. vulgaris*, Michx.). INDIAN-CURRENT. CORAL-BERRY. Deciduous bushy shrub 3-7 ft. high; branchlets slender, upright, densely leafy, downy; lvs. broadly oval or ovate,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, obtuse or acute, somewhat glaucous and usually pubescent beneath, very shortly petioled; fls. produced in summer, in dense short axillary clusters or spikes from the lower sides of the twigs; corolla campanulate,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, dull white; style hairy; berries purplish-red, subglobose,  $\frac{1}{8}$ - $\frac{1}{4}$  in. across, in late autumn. N. J. to Ga., Kans. and Tex. west to S. D.; sometimes escaped.—A var. has lvs. variegated with yellow.

2. *S. occidentalis*, Hook. WOLFBERRY. Deciduous shrub to 4 ft. high, with upright rather stiff branches; lvs. oval or ovate, 1-3 in. long, entire or undulate-crenate, apiculate, grayish-green and pubescent beneath; fls. in summer, in dense axillary or terminal spikes or racemes  $\frac{1}{2}$  1 in. long; corolla pinkish-white, campanulate,  $\frac{1}{4}$  in. long, deeply 5-lobed, pubescent inside; style and stamens exserted; fr. subglobose, white, about  $\frac{1}{2}$  in. long, produced in early autumn. Ill. and Mich. to B. C. south to Colo. and Kans.

3. *S. albus*, Blake (*S. racemosus*, Michx.). SNOWBERRY. WAXBERRY. Deciduous shrub to 3 ft. high, with upright slender branches; lvs. round-oval to oblong, 1-2 in. long, obtuse, often apiculate, pubescent beneath, those on the young shoots often sinuately lobed; fls. in terminal or axillary spikes or clusters, all summer; corolla campanulate, pinkish, about  $\frac{1}{4}$  in. long; style and stamens included; fr. globose or ovoid, snow-white,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, maturing in autumn and persisting through the winter. N. S. to Alaska south to Pa., Ida. and Calif.—Var. *lævigatus*, Blake (*S. racemosus* var. *lævigatus*, Fern.). To 6 ft. high; lvs. glabrous, usually larger; fr.-clusters larger. Que. to Wash., south to Va., often escaped. This is the snowberry generally cult. as *S. racemosus*.

4. *S. acutus*, Dipp. (*S. mollis* var. *acutus*, Gray). Low diffuse or procumbent soft-pubescent shrub; lvs. elliptic to elliptic-oblong,  $\frac{1}{2}$ -1 in. long, acute at both ends, grayish or whitish beneath, often irregularly dentate; fls. in terminal few-fl. clusters and solitary or in 2's in the axils below; corolla campanulate, pinkish or white, about  $\frac{1}{6}$  in. long; fr. subglobose, white,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long. Summer; fr. late summer and early autumn. Wash. to Calif. east to Ida., Colo. and New Mex.

5. **LONICERA**, L. HONEYSUCKLE. Shrubs widely planted for ornament; about 175 species throughout the northern hemisphere in Amer. south to Mex. and in Asia south to Java.—Deciduous or rarely half evergreen or evergreen, erect or climbing; lvs. opposite, simple, entire or rarely sinuately lobed, usually short-petioled, sometimes with distinct stipules; fls. more or less irregular, in axillary peduncled pairs subtended by 2 bracts and 4 bractlets, the latter often more or less connate or sometimes wanting, or fls. in sessile whorls at the ends of the branches; calyx 5-toothed; corolla with short or slender often gibbous tube, 2-lipped or almost equally 5-lobed; stamens 5; ovary usually 2-3- rarely 5-celled; fr. a few- to many-seeded berry. (Lonic-era: after Adam Lonicer or Lonitzer, 1528-1586, German physician and naturalist.)

A. Fls. in axillary pairs.

B. Plant upright or sometimes prostrate.

C. Corolla with regular or nearly regular 5-lobed limb.

D. Tube of corolla equally tubular or campanulate; berries distinct, whitish or pale bluish-purple, bloom-covered..... 1. *L. spinosa*



- DD. Tube of corolla more or less ventricose or gibbous.  
 E. Bracts narrow, usually subulate.  
 F. Ovaries and frs. distinct: fr. red.  
 G. Lvs. pubescent when young,  $1\frac{1}{2}$ –3 in. long. . . . . 2. *L. canadensis*  
 GG. Lvs. glabrous,  $\frac{1}{4}$ – $1\frac{1}{4}$  in. long. . . . . 3. *L. pyrenaica*  
 FF. Ovaries connate at base and tightly inclosed in a cupule formed by the bractlets.  
 G. Frs. seemingly connate, blue, bloom-covered. . . . . 4. *L. cærulea*  
 GG. Frs. distinct, purple.  
 H. Habit prostrate: lvs.  $\frac{1}{4}$ – $1\frac{1}{2}$  in. long, usually narrowed at base. . . . . 5. *L. pileata*  
 HH. Habit upright: lvs.  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, usually rounded at base. . . . . 6. *L. nitida*  
 EE. Bracts broad, enveloping the ovaries.  
 F. Stamens equaling the corolla-limb; corolla yellowish or slightly tinged red. . . . . 7. *L. involucrata*  
 FF. Stamens not exceeding the corolla-tube; corolla orange-yellow tinged red. . . . . 8. *L. Ledebourii*  
 CC. Corolla 2-lipped.  
 D. Branches with solid white pith.  
 E. Lvs. not apiculate: branchlets hispid with recurved bristles. . . . . 9. *L. Standishii*  
 EE. Lvs. apiculate: branchlets glabrous. . . . . 10. *L. fragrantissima*  
 DD. Branches hollow, with brown pith.  
 E. Color of fls. light or deep pink, sometimes white, not changing to yellowish.  
 F. Outer lobes of upper lip distinct. . . . . 11. *L. tatarica*  
 FF. Outer lobes of upper lip nearly distinct. . . . . 12. *L. amœna*  
 EE. Color of fls. yellow or changing to yellow or yellowish.  
 F. Peduncles shorter than or about equaling the petioles.  
 G. Fr. red: corolla-tube not swollen. . . . . 13. *L. Maackii*  
 GG. Fr. white: corolla-tube swollen. . . . . 14. *L. quinquelocularis*  
 FF. Peduncles longer than petioles.  
 G. Bractlets about as long as the ovary. . . . . 15. *L. Morrowi*  
 GG. Bractlets shorter than ovary.  
 H. Blossoms pure white or pink.  
 I. Lvs. obtusish or acute. . . . . 16. *L. bella*  
 II. Lvs. acuminate.  
 J. Under side of lvs. nearly glabrous: fls. often pinkish. . . . . 17. *L. notha*  
 JJ. Under side of lvs. grayish-pubescent: fls. white, changing to yellow. . . . . 18. *L. Ruprechtiana*  
 HH. Blossoms yellowish-white, sometimes tinged with red.  
 I. Lvs. acute or obtuse. . . . . 19. *L. Xylosteum*  
 II. Lvs. acuminate. . . . . 20. *L. chrysantha*  
 BB. Plant climbing.  
 C. Lvs. not white-tomentose below: fls.  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. long. . . . . 21. *L. japonica*  
 CC. Lvs. white-tomentose below: fls. 2 in. long. . . . . 22. *L. similis*  
 AA. Fls. in usually 6-fld. whorls at ends of the branchlets or sometimes axillary.  
 B. Tube of corolla three or more times longer than limb.  
 C. Limb nearly regular. . . . . 23. *L. sempervirens*  
 CC. Limb 2-lipped. . . . . 24. *L. Brownii*  
 BB. Tube of corolla as long to twice as long as limb; limb deeply 2-lipped.  
 C. Corolla  $\frac{1}{2}$ – $1\frac{1}{4}$  in. long.  
 D. Bractlets at least half as long as ovary; corolla  $\frac{1}{2}$  in. long. . . . . 25. *L. hispidula*  
 DD. Bractlets one-third as long as ovary or shorter: corolla longer.  
 E. Style and inside of corolla-tube pubescent: disk formed by connate upper lvs. very glaucous above. . . . . 26. *L. prolifera*  
 EE. Style and inside of corolla-tube glabrous: disk of connate upper lvs. bright green above. . . . . 27. *L. flava*  
 CC. Corolla  $1\frac{1}{2}$ –3 in. long.  
 D. Whorls of fls., at least the lower ones, in axils of connate lvs.  
 E. Bractlets minute or wanting: whorls of fls. only 1 or 2. . . . . 28. *L. Caprifolium*  
 EE. Bractlets about half as long as ovaries: whorls several. . . . . 29. *L. americana*  
 DD. Whorls of fls. in peduncled heads or spikes.  
 E. Lvs. below the infl. connate.  
 F. Fls. in elongated spikes with remote whorls. . . . . 30. *L. Heckrottii*  
 FF. Fls. in dense heads. . . . . 31. *L. etrusca*  
 EE. Lvs. all distinct: fls. in a dense head. . . . . 32. *L. Periclymenum*

1. *L. spinosa*, Jacquemont. Stiff shrub to 4 ft., the spinescent branches with solid white pith: lvs. linear-oblong, about  $\frac{1}{2}$  in. long: fls.  $\frac{3}{4}$  in. long, in axillary pairs; corolla with slender cylindric tube and spreading limb; stamens and style exerted: fr. pale bluish-red or whitish, bloom-covered. Himalayas.—Var. *Alberti*, Rehd. (*L. Alberti*, Regel). Graceful shrub with slender arching or procumbent

unarmed branches: lvs. linear or linear-lanceolate,  $\frac{1}{2}$ – $1\frac{1}{4}$  in. long, sometimes with 2–4 teeth at base, glaucous or bluish-green: fls. rosy pink, fragrant, in axillary pairs on slender erect peduncles; corolla-tube  $\frac{1}{3}$ – $\frac{1}{2}$  in. long: berries  $\frac{1}{3}$  in. diam., purplish-red, not united. Turkestan.

2. *L. canadensis*, Marsh. (*L. ciliata*, Muhl.). To 5 ft. high: lvs. ovate or oval,  $1\frac{1}{2}$ –3 in. long, acutish, rounded or cordate at base, margins ciliate, pubescent beneath when young; fls. yellowish or sometimes slightly tinged red,  $\frac{2}{3}$  in. long, produced in spring, in slender-peduncled axillary pairs; corolla-tube gibbous at base: berries distinct, light red, watery, in summer. Que. to Pa. and Mich. and west.

3. *L. pyrenaica*, L. Glabrous shrub to 3 ft. high: lvs. cuneate-oblong, to  $1\frac{1}{4}$  in. long, acute, sessile or subsessile; fls. in slender-peduncled axillary pairs, tubular-campanulate, regularly 5-lobed, white,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long: frs. red, distinct. Pyrenees Mts.

4. *L. cærulea*, L. Variable branching erect or spreading shrub to 5 ft.; branchlets glabrous or pubescent when young: lvs. oval, obovate or oblong,  $\frac{1}{2}$ –2 in. long, rounded at apex, pale or glaucous-green, pubescent or nearly glabrous, often stipulate: fls. twin, yellowish or greenish-white,  $\frac{1}{2}$ – $\frac{1}{2}$  in. long, axillary, short-peduncled, produced in spring; corolla-tube gibbous at base, the limb nearly regular; ovaries united, commonly exceeded by the subulate or linear bracts: fr. blue, bloom-covered, consisting of the 2 berries connate at base and wholly covered by the connate bractlets, hence seemingly connate throughout. N. Eu., N. Asia, N. Amer.—Vars. differ in amount and kind of pubescence, in shape of lvs. and in form of fls.

5. *L. pileata*, Oliver. Evergreen or semi-evergreen spreading shrub, sometimes prostrate: lvs. oval to oblong-lanceolate,  $\frac{1}{4}$ – $1\frac{1}{3}$  in. long, obtusish, glabrous, dark green and glossy above, tapering at base, very short-stalked: fls. whitish, fragrant, opening in spring, erect, in pairs, on short axillary peduncles; corolla funneliform,  $\frac{1}{2}$  in. long, the tube gibbous at base, limb nearly regular; stamens exserted; ovaries distinct, inclosed by the connate bractlets: fr. a translucent purple color,  $\frac{1}{2}$  in. wide, surrounded by a cupule formed by the connate bractlets and invested at top by a curious outgrowth of the calyx. China.

6. *L. nitida*, Wils. Evergreen shrub to 6 ft., with upright densely leafy branches; young shoots slender, purplish, sparsely bristly: lvs. ovate to oblong-ovate,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, obtuse, subcordate to broadly cuneate at base, glossy above, glabrous or nearly so: fls. creamy-white, fragrant, produced in axillary short-stalked pairs: fr. globular, blue-purple, transparent, about  $\frac{1}{4}$  in. across, the berries distinct but surrounded by the connate bractlets and therefore seemingly connate. W. China.

7. *L. involucrata*, Banks. TWINBERRY. Upright shrub 3–7 ft. high, glabrous or somewhat pubescent: lvs. elliptic-ovate to oblong-lanceolate, 2–5 in. long, acutish to acuminate, bright green, glabrous or slightly hairy beneath, short-petioled: fls. yellow or tinged with red, about  $\frac{1}{2}$  in. long, borne in pairs on long erect axillary peduncles, subtended by broad bracts which are often reddish or purple; corolla-tube saccate on one side at base, the limb with nearly equal spreading lobes; stamens as long as limb: berries black, shining, globose, almost inclosed by the enlarged purple bractlets. Spring and summer. N. B. to Alaska south to Mex.—There are vars. with fls. yellowish or bright scarlet. Also one is dwarfier and smaller-leaved.

8. *L. Ledebourii*, Esch. Erect shrub to 8–9 ft.: lvs. ovate-oblong, 2–4 in. long, dull dark green above, downy beneath, short-petioled: fls. in summer, deep orange-yellow tinged with red, in axillary pairs on a downy erect stalk  $1$ – $1\frac{3}{4}$  in. long, subtended by 2 reddish bracts and bractlets, these enlarged in fr.; corolla tubular, to  $\frac{3}{4}$  in. long, saccate at base, the lobes rounded and erect; stamens not longer than tube: berries black, almost enveloped by the bractlets, ripening in late summer and autumn. (Bears the name of Karl Friedr. v. Ledebour, professor at Dorpat, Russia, who traveled in 1826 in the interests of botany.) Calif.

9. *L. Standishii*, Carr. (*L. sinensis*, Hort. *L. fragrantissima*, of some authors). Semi-evergreen shrub to 8 ft., the spreading branches with reflexed bristly hairs: lvs. oblong-ovate to ovate-lanceolate, 3–4 in. long, acute or acuminate, sparsely hispid: fls. creamy-white or slightly blushed, very fragrant,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, borne in pairs on rather short curved peduncles, often 2 pairs at each joint; corolla bilabiate, usually bristly outside: fr. red, the 2 ovaries united nearly to the top and forming a berry. Mar.–Apr.; fr. early June. (Named for the nurseryman who grew many of Fortune's collections.) China.—A var. has narrow-lanceolate lvs.

10. *L. fragrantissima*, Lindl. Shrub to 8 ft., deciduous or evergreen, glabrous except for the lf.-margins and midrib: lvs. rather stiff and leathery, broadly oval,

1-2 in. long, short-stalked, strongly apiculate, dull dark green above, rather glaucous beneath: fls. creamy-white, very fragrant,  $\frac{5}{8}$  in. long, several pairs in an axil, on short peduncles; corolla 2-lipped, glabrous outside: fr. as in *L. Standishii*. Mar.-May. China.

11. *L. tatarica*, L. Deciduous bushy shrub reaching 10 ft.; young shoots sometimes pubescent: lvs. ovate to oblong-ovate, 1-2½ in. long, sometimes pubescent beneath and ciliate when young: fls. pink, crimson or white,  $\frac{3}{4}$ -1 in. long, in pairs on slender axillary peduncles; corolla bilabiate, glabrous without, hairy within, the upper lip with outer lobes distinct, the tube gibbous at base, much shorter than the spreading or reflexed oblong lobes; ovaries distinct, subtended by the small bractlets, these distinct or connate at base: berries red, rarely yellow. Late spring and summer; fr. late summer. S. E. Russia to Siberia.—There are numerous vars. differing in size and shade of fls. Var. *latifolia*, Loud., has lvs. to 4 in. long and fls. pink, the lobes bordered light pink.

12. *L. amœna*, Zabel. Branchlets nearly glabrous: lvs. ovate,  $\frac{3}{4}$ -2 in. long, acute or obtuse, rounded or subcordate at base, ciliate, often pubescent beneath: fls. very numerous, in pairs on slender axillary stalks; corolla  $\frac{3}{4}$  in. long, pink or white, the outer lobes of the upper lip nearly distinct: berries distinct, subtended by the very small slightly connate or distinct bractlets. Late spring and early summer. Of garden origin, a hybrid between *L. Korolkowii*, Stapf., var. *floribunda*, Nichols. and *L. tatarica*, L., the former with short-pubescent branchlets and lvs., upper corolla-lip parted about half its length, and bractlets connate into pairs.

13. *L. Maacki*, Maxim. Spreading upright shrub to 15 ft., the branchlets short-pubescent: lvs. elliptic-ovate to ovate-lanceolate, 1½-3 in. long, acuminate, narrowed at base, dark green, downy on both surfaces, short-petioled: fls. fragrant, pure white becoming yellowish with age, in axillary pairs on peduncles shorter than the petioles; bractlets half to as long as the ovary; calyx distinctly 5-toothed, nearly as long as ovary; corolla  $\frac{3}{4}$  in. long, bilabiate, the upper lip erect with outer clefts deeper than the middle, the tube short and not gibbous; stamens about twice as long as corolla-tube, downy at base; style hairy: fr. dark red, the berries distinct. Summer; fr. in autumn. (Named for Richard Maack, 1825-1886, Russian naturalist who explored N. E. Asia.) N. E. Asia, Cent. Japan.

14. *L. quinquelocularis*, Hardw. Shrub to 15 ft. high; young shoots very downy: lvs. oval, 1-3 in. long, mostly acuminate, rounded or tapered at base, short-petioled, slightly pubescent: fls. creamy-white becoming yellow, borne in axillary pairs on peduncles about equaling the petioles; corolla 2-lipped,  $\frac{3}{4}$  in. across, the tube  $\frac{1}{4}$  in. long, somewhat swollen; stamens about as long as the upper lip, pubescent at base: berries translucent white, globose to ovoid. Himalayas and China.

15. *L. Morrowi*, Gray. Deciduous shrub to 8 ft., with wide-spreading branches: lvs. oval or oblong-ovate, 1-2½ in. long, acute or obtusish, grayish-tomentose beneath: fls. twin, on slender axillary peduncles exceeding the petioles; bractlets distinct, about as long as the ovary; corolla 2-lipped, downy, creamy-white, becoming yellow in age, the slender tube slightly swollen at base, the spreading spatulate lobes  $\frac{1}{2}$  in. long, twice as long as tube: berries blood-red, distinct. Late spring and early summer. (Named for a famous traveler in Japan; page 124.) Japan.—Hybridizes easily with *L. tatarica*.

16. *L. bella*, Zabel (*L. Morrowi* × *L. tatarica*). Upright spreading shrub, with branchlets commonly slightly pubescent: lvs. ovate to ovate-oblong, 1-2 in. long, obtusish or acute, usually truncate at base, slightly pubescent beneath or nearly glabrous: fls. in axillary pairs, the peduncles about  $\frac{1}{2}$  in. long, longer than the petioles; bractlets nearly orbicular to ovate, one-half to three-quarters as long as ovary; corolla bilabiate, about  $\frac{1}{2}$  in. long, white to pink, changing to yellow, with spreading lobes, the outer lobes of the upper lip distinct: fr. red, the berries distinct, about  $\frac{3}{8}$  in. diam. Late spring and early summer; fr. summer. Garden origin.—Runs into white forms as var. *albida*, Hort. (*L. albida*, Hort.).

17. *L. notha*, Zabel (*L. Ruprechtiana* × *L. tatarica*). Nearly or quite glabrous upright strong-growing shrub: lvs. ovate to ovate-lanceolate, rarely elliptic, 1½-2½ in. long, acuminate, rounded or truncate at base: fls. in axillary pairs on peduncles longer than petioles; bractlets ovate, about one-third as long as ovary, rarely longer, glabrous or glandular-ciliate; corolla  $\frac{3}{4}$  in. long, white, yellowish or pinkish, the upper lip erect, divided to the middle or sometimes nearly to base, the tube short and gibbous: fr. red. Late spring and early summer; fr. July-Aug. (*Notha*: spurious.) Garden origin.

18. *L. Ruprechtiana*, Regel. To 12 ft. high: lvs. ovate-lanceolate to lanceolate, 2-4 in. long, acuminate, commonly dark green above, grayish-pubescent beneath:

fls. twin, on peduncles longer than the petioles; bractlets glandular-ciliate, about one-third as long as ovary; corolla 2-lipped, pure white changing to yellowish, glabrous outside: fr. red or sometimes yellow. Late spring and early summer. (F. J. Ruprecht was a Russian botanist of the 19th century.) Manchuria.—Likely to hybridize with *L. tatarica*, the hybrids being more common in gardens than *L. Ruprechtiana* and recognizable by their glabrescent foliage and pinkish-tinged fls.

19. *L. Xylosteum*, L. Deciduous shrub to 10 ft., very bushy; young shoots downy: lvs. oval to obovate, 1-2½ in. long, acute or obtuse, glabrous or sparsely pubescent above, more densely pubescent beneath: fls. yellowish-white or reddish-tinged, in pairs, on axillary peduncles longer than the petioles; bractlets pubescent, suborbicular, about half as high as the ovary; corolla very downy, conspicuously 2-lipped, the tube short and gibbous; stamens well exserted; berries dark red, distinct. Fls. late spring and early summer; fr. late summer and autumn. (*Xylosteum*: Greek *wood* and *bone*, in allusion to the hardness of the wood, an herbalist name.) Eu., W. and N. Asia, and sometimes escaped from cult.—A hybrid with *L. tatarica*, known as *L. xylosteoides*, Tausch. (*L. nelapensis*, Kirchn.) has rhombic-ovate lvs. and small pinkish fls.

20. *L. chrysantha*, Turcz. Erect shrub to 12 ft., with pilose rarely glabrous branchlets: lvs. oval or rhombic-ovate to rhombic-lanceolate, 2-5 in. long, acuminate, pilose or above nearly glabrous: fls. yellowish-white changing to yellow, in pairs on hairy axillary peduncles longer than the petioles; bractlets distinct, ovate, one-third to one-half as long as the ovary; corolla ½-¾ in. long, the upper lip cleft about one-half, the short tube strongly gibbous: fr. coral-red, the berries distinct. Fls. late spring and early summer; fr. autumn. N. E. Asia to Cent. Japan.

21. *L. japonica*, Thunb. Half-evergreen climber to 20 or even 30 ft., with hollow twining st.; branchlets usually hairy when young: lvs. ovate, oval or oblong, 1½-3½ in. long, acute or obtuse and apiculate: fls. white, often purplish outside, changing to yellow, fragrant, produced all summer, in axillary pairs on young shoots, often much crowded toward the ends; peduncles short, bearing 2 ovate bracts ½-¾ in. long; bractlets half to as long as the ovary; corolla 1¼-1½ in. long, pubescent, the tube slender, the limb 2-lipped; berries black, distinct. Summer. China, Japan; naturalized in some places from N. Y. to N. C.—There are several vars. differing in color of fls., length of corolla-lobes and size of bracts. Var. *Halliana*, Nichols. (*L. Halliana*, Hort.), has fls. which are purplish outside. Var. *flexuosa*, Arb. Kew. (*L. brachypoda*, DC.). Lower: peduncles as long as or shorter than the petioles: fls. 1½ in. long.

22. *L. similis*, Hemsl. Allied to *L. japonica*: plant pilose: lvs. ovate-oblong to lanceolate, 1¾-3½ in. long, ciliate, white-tomentose below: fls. slender-peduncled, white, 2 in. long; bracts subulate. Cent. and W. China.

23. *L. sempervirens*, L. TRUMPET HONEYSUCKLE. Glabrous high-climbing shrub, evergreen southward: lvs. oval or oblong, 1½-3 in. long, obtuse or rounded and often apiculate at apex, glaucous beneath, the uppermost 1-2 pairs connate at base: fls. in a peduncled interrupted terminal spike consisting of several usually 6-fld. whorls, not fragrant; corolla orange-scarlet outside, yellow within, 1½-2 in. long, the short limb with nearly equal lobes, the slender tube slightly swollen at base. Late spring to early autumn. Conn. to Fla. west to Neb. and Tex.; farther north sometimes escaped from cult.—There are several vars. with fls. yellow, orange-red or more brilliant scarlet.

24. *L. Brownii*, Carr. Probably hybrid of *L. sempervirens* with *L. hirsuta*. Similar to *L. sempervirens*, but the fls. usually shorter, the corolla-tube gibbous at base, the limb 2-lipped. Of garden origin.

25. *L. hispidula*, Dougl. Bushy, sarmentose or feebly twining, usually hirsute or glabrescent: lvs. oval or orbicular, 1-2½ in. long, rounded at apex, often with leafy stipules, the uppermost connate or occasionally distinct: spikes slender, pedunculate, commonly paniced, of few or several whorls of fls.; corolla pink to purplish, barely ½ in. long, the tube about as long as the limb, gibbous, more or less hairy within. B. C. to Ore.—Var. *subspicata*, Gray. More or less pubescent or glandular above: lvs. ½-1 in. long, commonly all distinct: fls. pale pink or yellowish. Calif.

26. *L. prolifera*, Rehd. (*L. Sullivanii*, Gray. *Caprifolium proliferum*, Kirchn.). Climbing to 6 ft. high, very glaucous: lvs. oval, obovate or oblong, 2-4 in. long, often finely pubescent beneath, sessile or connate, the uppermost into an orbicular disk very glaucous above: fls. in short-stalked or almost sessile spikes of several whorls each; corolla 2-lipped, about 1 in. long, pale yellow, often purplish-marked outside, the slender tube slightly swollen on one side and only a little longer than the



bilabiate limb, pubescent within; style hairy: berries scarlet,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam. Late spring and early summer; fr. autumn. Ont. to Man. south to Tenn.—Often in cult. under the name *L. flava*.

27. *L. flava*, Sims. Climbing to 10 ft.: lvs. broadly oval to elliptic,  $1\frac{1}{2}$ –3 in. long, glaucous beneath, glabrous, the upper connate into a broad disk bright green above: fls. bright or orange-yellow, fragrant,  $1-1\frac{1}{4}$  in. long, in a peduncled head; corolla-tube slender, not swollen, longer than the limb, glabrous inside; style glabrous. Spring. N. C. to Ky., Ga. and Ala.—Rare in cult. and *L. prolifera* is often cult. under this name.

28. *L. Caprifolium*, L. (*L. pallida*, Host.). Deciduous climber to 20 ft., glabrous or nearly so: lvs. obovate or oval to oblong, 2–4 in. long, rounded at apex, the 2–3 uppermost pairs connate forming a cup: fls. fragrant,  $1\frac{1}{2}$ –2 in. long, in whorls of usually 2–3, produced in the axils of the connate lvs.; corolla 2-lipped, yellowish-white, often slightly purplish and hairy outside, the tube slender: fr. orange-colored, the bractlets very small or none. Early spring and summer. (Caprifolium, herbalist name: Latin *goat and leaf*, i. e., a plant which climbs like a goat.) Cent. Eu. to W. Asia; sometimes escaped from cult.

29. *L. americana*, Koch (*L. etrusca*, Hort. *L. Caprifolium*, Auth.). Climbing: lvs. broadly oval to oblong-obovate, 2–4 in. long, glabrous, the upper connate: fls. fragrant, to 2 in. long, the upper whorls somewhat crowded and without connate lvs. at base; corolla 2-lipped, yellowish, usually purple outside and glabrous; bractlets about half as long as ovary, smaller on the upper fls. Summer. Probably hybrid of *L. etrusca* and *L. Caprifolium*, much cult., mostly under the name of the latter, and sometimes escaped from cult.

30. *L. Heckrottii*, Rehd. Loose and spreading, only partially climbing: lvs. elliptic or oval,  $1\frac{1}{2}$ –2 in. long, nearly sessile, acute or rounded at apex, glaucous beneath, glabrous, the uppermost pairs united by their bases: fls.  $1\frac{1}{2}$ –2 in. long, in peduncled spikes with few somewhat remote whorls; corolla bilabiate, purple or pink outside, yellow within, the slender tube glandular within and without; bractlets about half as long as ovary. Summer to early autumn. Origin unknown, probably a garden hybrid of *L. americana* and *L. sempervirens*. (Heckrottii: a name in the American trade.)

31. *L. etrusca*, Santi. Vigorous climber: lvs. broadly oval to obovate, 1–3 in. long, usually obtuse, glabrous or pubescent, the upper ones connate into an oval obtuse disk or rarely distinct: fls. fragrant, in dense usually long-peduncled heads borne in terminal or axillary groups of 3; corolla yellowish-white, usually reddish tinged, 2-lipped,  $1\frac{1}{2}$ –2 in. long, with very slender tube sometimes glandular. Late spring to midsummer. Distributed through the whole Medit. region in many different forms.

32. *L. Periclymenum*, L. WOODBINE. Twining shrub, the sts. often over 20 ft. long: lvs. all distinct, ovate to oblong-ovate,  $1\frac{1}{2}$ –3 in. long, mostly acute, dark green above, pale or glaucous beneath and sometimes sparingly pubescent: fls. very fragrant, in a dense peduncled terminal head; corolla 2-lipped, yellowish-white, usually carmine or purple outside,  $1\frac{1}{2}$ –2 in. long, the tube slender, tapering, glandular-pubescent outside: berries red. Summer to early autumn. (Periclymenum, herbalist name: Greek *around and surround*, referring to the twining habit.) Eu., N. Afr., W. Asia.—There are several vars., one with lvs. sinuately lobed. Var. *belgica*, Ait. has lvs. whitish beneath and fls. pale purple outside. Var. *aurea*, Lind. & André, has yellow or yellowish lvs.

6. **ABELIA**, R. Br. Over 20 species in E. and Cent. Asia, 1 in the Himalayas and 2 in Mex., several planted for ornament.—Small or medium-sized bushy shrubs with deciduous or persistent foliage: lvs. opposite, short-petioled, entire or dentate: fls. rather small but numerous, varying from white to pink or purple, in 1- to several-fl'd. cymes, axillary or terminal on short branchlets, sometimes forming panicles at the ends of the branches; calyx with 5 (rarely 2–4) elongate segms. usually purplish and conspicuous, persistent after the corolla has fallen; corolla tubular or campanulate, the limb equally 5-lobed; stamens 4, paired, inserted on the base of the corolla-tube; ovary 3-celled, only 1 cell fertile: fr. a 1-seeded leathery achene, crowned by the persistent calyx. (Abelia: bears the name of Dr. Clarke Abel, 1780–1826, physician and author in China.)

Fls. in terminal panicles; corolla funnelform, not over  $\frac{3}{4}$  in. long.

- Panicles loose; calyx-segms. 2-5, usually more or less connate; corolla  $\frac{3}{4}$  in. long. .... 1. *A. grandiflora*  
 Panicles dense; calyx-segms. 5, distinct; corolla  $\frac{1}{2}$  in. long. .... 2. *A. chinensis*  
 Fls. axillary; corolla tubular,  $1\frac{1}{2}$  in. long. .... 3. *A. floribunda*

1. *A. grandiflora*, Rehd. (*A. chinensis*  $\times$  *A. uniflora*. *A. rupestris*, Hort., not Lindl.). Half-evergreen shrub 3-6 ft. high; branches minutely downy: lvs. ovate,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, rounded or attenuate at base, tapering to a blunt or acutish tip, serrate, nearly glabrous, shining above: fls. in loose terminal panicles; calyx-segms. 2-5, usually more or less connate, often purplish; corolla broadly funnelform, white flushed pink,  $\frac{3}{4}$  in. long, hairy in the throat; stamens not exerted. Flowering continuously June-Nov. Garden origin.

2. *A. chinensis*, R. Br. (*A. rupestris*, Lindl.). Deciduous shrub 3-6 ft. high, of spreading habit; young branches minutely reddish-downy: lvs. ovate,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, rounded at base, serrate, more or less hairy above and on the midrib beneath: fls. in dense terminal panicles; calyx-segms. 5, distinct, rosy-tinted; corolla funnelform, white,  $\frac{1}{2}$  in. long; stamens exerted. Summer. China.

3. *A. floribunda*, Decne. Evergreen shrub 3-6 ft. high; young branches downy: lvs. oval or ovate,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, acute or obtusish, shallowly toothed, glossy-green, hairy only on the margin: fls. pendulous, 1-3 at or near the ends of short twigs; calyx-segms. 5, green; corolla carmine-purple, tubular narrowing toward base,  $1\frac{1}{2}$  in. long, with 5 rounded spreading lobes; stamens hairy. Summer. Mex.

7. **DIERVILLA**, Mill. Deciduous free-flowering shrubs, frequently planted, especially the hybrid forms; about 10 species in N. Amer., and E. Asia. The Asian species are sometimes kept separate; they comprise the **WEIGELA** of gardens.—Lvs. opposite, mostly petioled, serrate; fls. in 1- to several-fld. axillary cymes, often paniced at the ends of the branches, yellowish-white, pink or crimson; calyx 5-toothed or 5-parted, mostly persistent; corolla tubular or campanulate, 5-lobed, sometimes slightly irregular; stamens 5; ovary 2-celled: fr. a slender 2-valved caps. with numerous minute seeds. (Diervilla: after N. Dierville, a French surgeon who took *D. Lonicera* to Eu. early in the 18th century.)

Fls. yellow, not 1 in. long, slightly 2-lipped. (DIERVILLA proper.)

- Lvs. distinctly petioled. .... 1. *D. Lonicera*  
 Lvs. sessile. .... 2. *D. sessilifolia*

Fls. white, pink or crimson, rarely yellowish, larger, not bilabiate. (**WEIGELA**, Thunb.)

Calyx-lobes lanceolate, connate to or nearly to the middle; stigma 2-lobed: seeds almost wingless.

- Branchlets with 2 hairy stripes: lvs. glabrous above except at the midrib. .... 3. *D. florida*  
 Branchlets glabrous: lvs. hairy above. .... 4. *D. præcox*

Calyx-lobes linear, divided to base; stigma capitate: seeds winged.

- Plant nearly glabrous. .... 5. *D. coræensis*  
 Plant more or less pubescent.

Corolla 1 in. long, almost blood-red: branchlets soft-hairy. .... 6. *D. floribunda*

Corolla larger, pale rose changing to carmine: branchlets glabrous. .... 7. *D. japonica*

- Fls. various, representing hybrid forms. .... 8. *D. hybrida*

1. *D. Lonicera*, Mill. (*D. trifida*, Moench. *D. canadensis*, Willd.). Spreading, 2-4 ft. high; branchlets nearly terete, glabrous: lvs. oval or ovate-oblong,  $1\frac{1}{2}$ -4 in. long, acuminate, distinctly petioled, serrate, nearly glabrous, finely ciliate: axillary cymes commonly 3-fld., terminal ones 3-5-fld.; calyx glabrous, with 5 erect subulate lobes; corolla yellow or in age darker, funnel-shaped, the tube  $\frac{1}{2}$  in. long, the limb nearly as long and sometimes irregular, 3 of the lobes more united, the middle one deeper yellow and villous on the face; style and stamens hairy below: caps. about  $\frac{1}{2}$  in. long, oblong, with a slender beak, crowned with the calyx-lobes. Summer. Newf. to Sask., south to Ky. and N. C.

2. *D. sessilifolia*, Buckl. To 5 ft. high, the branchlets quadrangular: lvs. ovate or ovate-lanceolate, 2-6 in. long, gradually acuminate, sessile, serrate, nearly glabrous, of firmer texture: cymes 3-7-fld., often crowded into dense terminal panicles; corolla yellow, the limb shorter than the tube, the lobes nearly equal, one of them obscurely pilose: caps. short-oblong, short-necked, crowned with short lanceolate-subulate calyx-lobes. Summer. N. C. and Tenn. to Ga. and Ala.

3. *D. florida*, Sieb. & Zucc. (*D. pauciflora*, Carr. *Weigela florida*, A. DC. *W. rosea*, Lindl. *W. amabilis*, Hort.). Spreading shrub to 6 ft.; branchlets with 2

hairy stripes: lvs. elliptic or ovate-oblong to obovate, 2-4 in. long, long-pointed, short-petioled or nearly sessile, serrate except toward base, glabrous above except at the midrib, tomentose on the veins beneath: fls. often in terminal 3's or 4's on short lateral twigs; calyx nearly glabrous, with 5 lanceolate lobes nearly as long as the tube; corolla funnel-shaped, 1½ in. long, downy and deep rose outside, paler within, the limb 1 in. across, with 5 spreading rounded lobes; stigma 2-lobed; ovary somewhat hairy: seeds almost wingless. May-June. N. China.

4. *D. præcox*, Lemoine. To 6 ft. high, with glabrous branchlets: lvs. elliptic or elliptic-ovate, 2-3½ in. long, acuminate, short-petioled, serrate, hairy above, soft-pubescent beneath: fls. in clusters of 3-5, nodding; calyx with subulate lobes about as long as the tube, very hairy; corolla 1½ in. long, abruptly narrowed below the middle, purplish-pink or rose-carmine. Early spring. Japan.—The earliest of all species to bloom; has given rise to a race of early-blooming hybrids.

5. *D. coræensis*, DC. (*D. grandiflora*, Sieb. & Zucc. *D. amabilis*, Carr. *Weigela coræensis*, Thunb.). Vigorous shrub 5-10 ft. high, nearly glabrous: lvs. broadly-ovate to elliptic, 3-4 in. long, abruptly acuminate, crenate-serrate, sparingly hairy on the veins beneath and on the petioles: fls. in 1-3-fl. peduncled cymes; calyx divided to base into linear lobes; corolla 1½ in. long, broadly funnelform abruptly narrowed below the middle, changing from whitish or pale pink to carmine; stigma capitate: seeds winged. Late spring and early summer. Japan.

6. *D. floribunda*, Sieb. & Zucc. (*Weigela floribunda*, C. Mey.). To 8 ft. high; branches slender, soft-hairy: lvs. ovate or oval, 3-4 in. long, acuminate, short-petioled, narrowed at base, serrate, pubescent on both surfaces especially the lower: fls. mostly sessile, usually crowded at the ends of short branchlets; calyx divided to base into linear lobes; corolla 1 in. long, funnelform, rather gradually narrowed toward base, with 5 spreading lobes about one-fifth as long as tube, pubescent outside, dark almost blood-red; style well exerted, stigma capitate. Late spring and early summer. Japan.—One var. has rather large brownish-crimson fls., another has greenish-white fls. changing to crimson.

7. *D. japonica*, DC. (*Weigela japonica*, Thunb.). To 6 ft. high; branchlets nearly glabrous: lvs. oblong-obovate or elliptic, 2-4 in. long, acuminate, serrate, sparingly pubescent above, tomentose beneath: fls. usually in 3-fl. short-peduncled cymes, often crowded at the ends of short branchlets; calyx divided to base; corolla 1-1¼ in. long, broadly funnelform, narrowed below the middle, whitish at first changing to carmine, slightly pubescent or nearly glabrous outside; style somewhat exerted. Late spring and early summer. Japan, China.—Var. *hortensis*, Rehd. (*D. hortensis*, Sieb. & Zucc.). Lvs. nearly glabrous above, densely grayish-tomentose beneath: cymes usually rather long-peduncled; fls. mostly carmine. Other vars. have pale pink or white fls.

8. *D. hybrida*, Dipp. (*Weigela hybrida*, Dipp.). Under this name are grouped the different hybrids of *D. florida*, *D. præcox*, *D. coræensis*, *D. floribunda* and *D. japonica*, which are now more commonly cult. than the typical species, and not readily defined. Here are included such hort. names as: *candida*, fls. white; *Hendersonii*, fls. light crimson; *Steltzneri*, Van Houtte, fls. dark red, abundant; *Van Houttei*, fls. carmine; *venosa*, fls. carmine-pink, carmine in bud, orange to crimson in throat; *Verschaffeltii*, fls. carmine-pink, limb bordered whitish; *Desboisii*, fls. small, dark crimson; *incarnata*, fls. deep red; *Lavallei*, fls. bright crimson; *luteo-marginata* (*Weigela amabilis* fol. var., Van Houtte), lvs. bordered yellow; *nana variegata* (*Weigela rosea nana* fol. var., Van Houtte), lvs. variegated with white, fls. nearly white, dwarf; *Sieboldii argenteo-marginata*, lvs. bordered white, fls. rose.

## 162. VALERIANACEÆ. VALERIAN FAMILY

Herbs and sometimes shrubs of wide distribution, most abundant in the northern hemisphere; about 9 genera and 300 species, some of them grown for ornament and for food.—Lvs. opposite, without stipules: fls. small, bisexual or polygamo-dioecious, in cymose or capitate clusters; corolla usually 5-merous as to envelopes, gamopetalous and epigynous, somewhat irregular, often spurred or swollen at base, bearing 1-3 rarely 4 stamens on its tube and alternate with lobes; ovary inferior, invested by the calyx-tube, 1-3-celled, one of the cells with a single ovule, the others empty: fr. a kind of achene, indehiscent. *H*, Fig. 13, page 684.

Plants somewhat shrubby, or if herbaceous with pinnately divided lvs. or pappus-like calyx: fr. mostly (in herbs always) 1-celled.

- Stamens 3; corolla not spurred.....1. VALERIANA  
 Stamen 1; corolla spurred.....2. CENTRANTHUS  
 Plants herbaceous, with mostly undivided lvs. and with calyx not  
 pappus-like: fr. mostly 3-celled, the lateral cells often greatly re-  
 duced.  
 Stamens 3: fr. about  $\frac{1}{4}$  in. long.....3. VALERIANELLA  
 Stamens 2: fr.  $\frac{1}{8}$ – $\frac{1}{4}$  in. long.....4. FEDIA

1. **VALERIANA**, L. VALERIAN. Genus of some 265 species, mostly in the temp. and colder regions of the northern hemisphere, two kinds planted in flower-gardens and borders.—Commonly glabrous herbs, subshrubs or shrubs, erect or scandent, with strong-smelling roots and often with very fragrant fls.: lvs. entire or dentate or 1–3-pinnatisect: cymes sometimes dense, few-fl. and terminal or in dense or interrupted spikes or variously paniced; fls. small, white or rose, in ours bisexual; calyx-limb of 5–15 lobes inconspicuous before fruiting, then unrolling and forming a kind of plumose pappus; corolla-tube attenuate at base, limb 5-cleft; stamens 3, rarely 1 or 2: fr. a compressed achene, the rear face 1-nerved, the front face 3-nerved. (Valeria-na: Latin to be strong, in allusion to medicinal uses.)

- Basal lvs. pinnatisect: rhizome truncate.....1. *V. officinalis*  
 Basal lvs. entire or at base incised-lobed: rhizome inclined.....2. *V. Phu*

1. **V. officinalis**, L. COMMON VALERIAN. GARDEN-HELIOTROPE. Perennial, to 5 ft. high, glabrous or below pubescent; rhizome truncate, sometimes stoloniferous; sts. erect, simple or above somewhat branched, grooved: lvs. all pinnatisect into 7–10-paired, entire or dentate-serrate, ovate-oblong or lanceolate segms., those of the upper lvs. acuminate: corymb broadly paniculate, long-branched; fls. small, numerous, very fragrant, whitish, pinkish or lavender, in the vars. white or red. Eu., N. Asia; frequent in old gardens and also escaped.

2. **V. Phu**, L. Glabrous or pilose perennial, lower than *V. officinalis*; rhizome inclined, simple, fusiform; st. stout, simple or slightly and shortly branched: basal lvs. ovate-oblong, long-petioled, entire or at base incise-lobed; st.-lvs. pinnately parted into 3–4 pairs of oblong, acute, entire, decurrent segms.: corymb trichotomous; fls. whitish to somewhat flesh-colored. (Phu: from the Arabic.) Caucasus region.—Var. **aurea**, Hort., has young shoots golden-yellow.

2. **CENTRANTHUS**, DC. CENTRANTH. About a dozen species in the Medit. region, grown for ornament.—Annual or perennial herbs or sometimes some of them half shrubby: lvs. entire, dentate or pinnatisect: fls. small, red or white, in dense terminal clusters; calyx cut into 5–15 narrow divisions, enlarging after flowering; corolla slender-tubed, 5-parted, spurred at base; stamen 1: fr. 1-celled, crowned with a pappus-like crest. (Centranthus: Greek spurred flower.)

- Plant perennial: lvs. mostly entire.....1. *C. ruber*  
 Plant annual: lvs. toothed or lobed.....2. *C. macrosiphon*

1. **C. ruber**, DC. RED VALERIAN. JUPITERS BEARD. Smooth and glaucous perennial, 1–3 ft. high, somewhat woody at base, forming a compact floriferous bushy plant: lvs. ovate to lanceolate, to 4 in. long, sessile and very broad at base or tapering to petiole, entire or sometimes toothed at base: fls. numerous, fragrant, deep crimson to pale red or white, about  $\frac{1}{2}$  in. long, the spur slender. Eu. to S. W. Asia; a familiar plant.

2. **C. macrosiphon**, Boiss. Annual cult. in rockeries and borders, 1–2 ft. high: lvs. ovate,  $1\frac{1}{2}$ –3 in. long, some sessile, others very long-petioled, toothed or lobed, glaucous: fls. deep rose, about  $\frac{1}{2}$  in. long. Spain.—There are white-fl. and dwarf forms.

3. **VALERIANELLA**, Mill. Some 50 species of the northern hemisphere, mostly in the Medit. region, two grown in the vegetable-garden.—Annual dichotomously branched herbs, glabrous or nearly so except the fr. and lf.-bases: lvs. of basal rosette entire; st.-lvs. entire, dentate or rarely incise-pinnatifid: fls. whitish, pale bluish or rose, in cymes which are sometimes



corymbosely paniculate-fastigiate, or sometimes densely globose at the ends of the branches; corolla-tube short or rarely elongate, with or without sac or spur, limb 5-cleft and spreading; stamens 3, rarely 2: fr. 3-celled, 2 cells empty. (Valerianella: diminutive of Valeriana.)

Fr. with empty cells as large as fertile one and its corky back: basal lvs. (including petiole) 2-3 in. long.....1. *V. Locusta*

Fr. with empty cells much narrower than fertile one: basal lvs. (including petiole) 3-5 in. long.....2. *V. eriocarpa*

1. *V. Locusta*, Betcke, var. *olitorea*, L. (*V. olitorea*, Poll.). CORN-SALAD. Small nearly glabrous branching annual to 1 ft. high, in Eu. growing among the corn (grain), whence the name "corn-salad": basal lvs. abundant and tufted, spatulate or oblong, toothed or entire, obtuse, 2-3 in. long including petiole; st.-lvs. similar, successively smaller, sometimes toothed: fls. very small, light blue, 5-lobed, in dense heads terminating forking branches: fr. ("seed") nearly orbicular, but with a short 2-pointed beak, flattened sidewise,  $\frac{1}{4}$  in. long, the 2 empty cells as large as the fertile one and its corky back. (Locusta: Latin for *locust*, from some fancied resemblance.) Eu.—Several vars. differ in color and size of lvs., one in size of seeds. *V. Locusta* itself is naturalized in this country; it is a smaller plant, without marked basal rosette, lvs. mostly entire.

2. *V. eriocarpa*, Desv. ITALIAN CORN-SALAD. Distinguished from the preceding by having lvs. 3-5 in. long (including petiole): seed flattened, convex on one side, hollowed on the other, surmounted by the obliquely truncate corolla-like calyx-limb, the empty cells very much narrower than the fertile one. S. Eu.

4. *FEDIA*, Moench. A single species of the Medit. region, grown as an ornamental and also somewhat as a salad plant.—Glabrous branching annual: lvs. entire or dentate: fls. small, red, in more or less dense terminal cymes; peduncles thick and hollow; corolla-tube elongate, limb 2-lipped, the 5 lobes unequal; stamens 2; style entire or 2-3-fid.: fr. with the 2 empty cells narrower than the fertile one. (Fe-dia: application doubtful.)

*F. Cornucopiæ*, DC. (*Mitrophora Cornucopiæ*, Kuntze). AFRICAN VALERIAN. St. stout, densely leafy, usually purplish, 10-16 in. long: lvs. ovate-spatulate,  $1\frac{1}{2}$ -4 in. long, shining green: fr.  $\frac{1}{8}$ - $\frac{1}{4}$  in. long, in shape somewhat resembling a grain of wheat. (Cornucopiæ: cornucopia-like.)

### 163. DIPSACEÆ. TEASEL FAMILY

Perennial, biennial or annual herbs of the Old World, a few cult. for commercial or ornamental purposes; about 7 genera and 140 species.—Lvs. opposite or rarely whorled, entire, toothed or pinnatifid: fls. small, in dense bracted and involucre heads or in interrupted spikes; calyx-tube adnate to the 1-celled simple ovary; stamens inserted on corolla-tube and alternate with its lobes, of the same number or fewer, distinct; ovary inferior, 1-celled; style filiform; stigma simple; ovule 1: fr. an achene. A, Fig. 14, page 749.

Fls. in dense heads or spikes: spines of the foliage, if present, rather short and stout.

Involucral bracts mostly in 1-2 series, seldom rigid, then always in 1 series and larger than those of the receptacle.

Bracts of receptacle rigid, spine-tipped: lvs. or st. or both commonly more or less spiny.....1. *DIPSACUS*

Bracts of receptacle herbaceous or reduced to hairs: lvs. and st. not spiny.....2. *SCABIOSA*

Involucral bracts in several series, thickly clustered and overlapping, commonly rigid, mostly smaller than the bracts of the receptacle....3. *CEPHALARIA*

Fls. in interrupted spikes: spines of the foliage rather long and slender....4. *MORINA*

1. *DIPSACUS*, L. TEASEL. About 15 species in Eu., N. Afr. to Abyssinia and Asia, one of commercial value.—Prickly or rough-hairy stout biennials: cauline lvs. mostly connate and cup-like at base: fls. in a terminal head or short spike with involucral bracts and those of the receptacle sharp or spine-tipped; calyx-limb cup-like, 4-toothed or -lobed; corolla 4-lobed, nearly regular; stamens 4; stigma lateral: fr. an achene adnate to and inclosed by the calyx-

like involucrel. (Dip-sacus: Greek *thirst*, because the connate lf.-bases in some species hold water.)

**D. fullonum**, L. FULLERS TEASEL (fullonum, of the fullers). Bracts of involucre usually shorter than the cylindric head, at length reflexed; bracts of the receptacle with recurved spine-tipped apex. An escape from Eu. about wool mills in the eastern and middle states; cult. in Cent. N. Y. for the "teasels" or ripe heads which are used by machinery for fulling (raising the nap) on woollen cloth.

**2. SCABIOSA**, L. MOURNING BRIDE. PINCUSHION-FLOWER. Herbs, of about 70 species in Eu., Asia and Afr., rare in the tropics; a few popular flower-garden plants.—Annual or perennial, more or less woody at base: lvs. entire, dentate, lobed or dissected: heads depressed subglobose or ovoid-conical, terminating long peduncles or rarely dichotomously sessile; bracts of the involucre 1-2-rowed, herbaceous; fls. blue, rose, yellowish or white; calyx bristly; corolla-limb 4-5-cleft, subequal or oblique or 2-lipped; stamens 4, rarely 2: achene adnate to involucrel at base or up to middle. (Scabiosa: Latin *itch*, referring to medicinal use.)

Basal lvs. dentate or lobed.

Plant annual: fls. dark purple, rose or white.....1. *S. atropurpurea*

Plant perennial: fls. violet-blue.....2. *S. japonica*

Basal lvs. entire: fls. light blue.....3. *S. caucasica*

**1. S. atropurpurea**, L. SWEET SCABIOUS. Branching annual about 2 ft. high: basal lvs. lanceolate-ovate, lyrate, coarsely dentate; st.-lvs. pinnately parted, the oblong lobes dentate or cut; fls. dark purple, rose or white, in long-peduncled heads, becoming ovate or oblong in fr.; involucre appressed-pubescent. S. Eu.—Very variable in size, habit and color of fls., the different forms being among the most popular flower-garden annuals.

**2. S. japonica**, Miq. Closely allied to *S. atropurpurea* but perennial, tufted, dichotomously branched: lvs. pinnatisect, lobes narrow: fl.-heads terminal or axillary, very long-peduncled, violet-blue, about 2 in. across; involucral bracts in 2 rows, very unequal, shorter than the fls. Japan.

**3. S. caucasica**, Bieb. Hardy perennial 18-30 in. high: lvs. glaucous or whitish, the lower entire, lanceolate-linear or oblanceolate, acute, the upper cut and divided: heads flattish; basal portion of involucre clothed with long dense matted gray hairs; fls. light blue. Caucasus.—The vars. differ in having silvery-gray foliage or the fls. flowered or variously colored.

**3. CEPHALARIA**, Schrad. Plants of the Medit. region, N. and S. Afr. and W. Asia, also in Abyssinia; about 30 species, somewhat planted for ornament.—Coarse annual or (ours) perennial herbs: lvs. entire, dentate or lobed: bloom something like that of Scabiosa; heads terminating long peduncles, ovoid or globular, bearing many 4-parted yellowish, whitish, or bluish florets; stamens 4, perfect: fr. a 4-8-ribbed achene, the calyx-border often remaining on its summit. (Cephalaria: Greek *head*, alluding to the capitate fl.-clusters.)

Fl.-heads sulfur-yellow: lvs. pinnatifid.....1. *C. alpina*

Fl.-heads cream-white: lvs. pinnate.....2. *C. tatarica*

**1. C. alpina**, Schrad. Widely branched perennial 5 or 6 ft. high: lvs. pubescent, pinnatifid, the segms. cut and decurrent: fl.-heads sulfur-yellow  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. across; involucre with 8 aristate teeth. S. Eu.

**2. C. tatarica**, Schrad. Rank perennial 6 ft. high: lvs. pinnate with broad-lanceolate serrate lfts.: heads flat, to 2 in. across, showy with cream-white fls. Russia, Asia Minor and east.

**4. MORINA**, L. Thistle-like perennials, one sometimes raised for ornament; about 10 species native to Asia.—Lvs. mostly spinose-toothed: fls. whorled in spikes, with wide spinose-toothed lf.-like bracts and with spinose bracteoles among the fls., the lower whorls distant; calyx 2-lipped, the lips entire or 2-lobed; corolla 5-lobed, somewhat 2-lipped, the tube curved, in ours long; stamens 2 or 4, with sometimes a sterile one. (Mori-na: after Louis Morin, 1636-1715, a French botanist.)

**M. longifolia**, Wall. WHORL-FLOWER. Perennial with stout st. pubescent above, 3-4 ft. high: foliage thistle-like; lvs. narrowly oblong or linear, 6 in. long, 1 in. wide: fls. showy, deepening from white in the bud to pink and finally crimson, the uppermost whorls densely crowded; calyx-lobes unequal, 2-lobed with obtuse not spinose lobes; corolla-tube  $1\frac{1}{4}$  in. long; fertile stamens 2, the filaments much shorter than the corolla-lobes. Himalayas, 9,000-14,000 ft.

#### 164. CUCURBITACEÆ. GOURD FAMILY

As known in cult., tendril-climbing (except in *Ecballium*) annual and perennial rapid-growing frost-tender herbs, grown for the edible frs. and for ornament; genera about 90 and species about 700, mostly in trop. regions around the world, some of them extending into temp. zones.—Sts. mostly soft, glabrous, hairy or prickly: lvs. alternate, broad, usually simple but often deeply cut, sometimes compound: tendrils lateral, simple or branched: fls. unisexual (plants monœcious, sometimes diœcious), regular; calyx adnate to ovary, 5-lobed; petals 5 or corolla gamopetalous and 5-lobed; stamens apparently 3 but really 5 with 2 pairs united, mostly monadelphous by contorted anthers; carpels commonly 3: fr. mostly indehiscent, sometimes a papery bladderly pod, more typically a fleshy berry-like structure (pepo) with a rind and spongy seedy interior. *G*, *I*, Fig. 13, page 684.

- A. Fr. a fleshy many-seeded pepo, with hard or firm rind, indehiscent, mostly edible.
  - B. Corolla bell-shaped and distinctly gamopetalous, 5-lobed to middle or a little more.
    - C. Anthers coherent..... 1. CUCURBITA
    - CC. Anthers free..... 2. SICANA
  - BB. Corolla of 5 petals or parted to base, rotate or open-bell-shaped.
    - C. Staminate fls. in racemes..... 3. LUFFA
    - CC. Staminate fls. solitary (although perhaps more than 1 in an axil).
      - D. Sepals leafy, serrate, reflexed..... 4. BENINCASA
      - DD. Sepals small, entire, erect or only spreading.
        - E. Tendrils branched.
          - F. Lvs. not lobed..... 5. LAGENARIA
          - FF. Lvs. pinnatifid..... 6. CITRULLUS
        - EE. Tendrils simple..... 7. CUCUMIS
    - AA. Fr. fleshy, large, indehiscent, edible, with 1 great seed. 8. SECHUIM
  - AAA. Fr. quite otherwise, several- to many-seeded, small berry, pod-like, bladderly, dryish or fleshy, mostly inedible: for the most part ornamental plants
    - B. Corolla bell-shaped, gamopetalous, lobed to middle..... 9. COCCINIA
    - BB. Corolla rotate or cup-shaped, lobed to base or of separate petals.
      - C. Petals fimbriate..... 10. TRICHOSANTHES
      - CC. Petals or corolla not fimbriate.
        - D. Peduncle, particularly of staminate fls., bearing a shield-shaped bract (in our species)..... 11. MOMORDICA
        - DD. Peduncle of staminate fls. naked.
          - E. Staminate fls. solitary..... 12. ABOBRA
          - EE. Staminate fls. in racemes or corymbs.
            - F. Lvs. compound or parted to base (in ours)..... 13. CYCLANTHERA
            - FF. Lvs. simple.
              - G. Ovules erect..... 14. ECHINOCYSTIS
              - GG. Ovules horizontal.
                - H. Tendrils present.
                  - I. Plant (in ours) diœcious: ovary globular..... 15. BRYONIA
                  - II. Plant monœcious: ovary elongated..... 16. MELOTHRIA
                - HH. Tendrils 0..... 17. ECBALLIUM

1. **CUCURBITA**, L. (*Pepo*, Mill.). About 10 species, annual and perennial (ours annual or cult. as such), all supposed to be American; grown for the frs., either as esculents or ornaments.—Long-running coarse rough-hairy scabrous monœcious plants with branched tendrils and simple mostly lobed lvs.: fls. solitary in axils in our species, the staminate long-peduncled, large, yellow, the corolla gamopetalous and lobed about half way down; anthers united; ovary 1-celled, with 3-5 placentæ, stigmas 2-lobed, 3-5 in number: fr. a large pepo. (Cucurbita: the Latin name for gourd.)—The nativity of Nos. 1-3 is undetermined, but evidence points to an American origin.

Seeds white.

Plant harsh and rough to the feel: lvs. usually strongly lobed: peduncle angular, expanded as it joins the fr.....1. *C. Pepo*

Plant soft or not harsh to the feel: lvs. for the most part little or not at all lobed.

Calyx-lobes mostly long and often leafy: peduncle angled, expanded at fr.....2. *C. moschata*

Calyx-lobes short and narrow: peduncle nearly cylindrical, not expanded at fr.....3. *C. maxima*

Seeds black.....4. *C. ficifolia*

1. *C. Pepo*, L. FIELD PUMPKIN. Plant with sharp stiff translucent harsh hairs, making it harsh to the hands, the sts. long-running: lvs. stiff and somewhat rigid, erect, triangular or ovate-triangular in outline, 6-12 in. long, pointed, usually prominently lobed and apiculate, margins irregularly sharp-serrate: corolla mostly with erect or spreading pointed lobes, the tube commonly narrow at base and flaring upward; calyx-lobes short and narrow: peduncle strongly angled, and expanding at attachment: fr. large, orange, furrowed, perishable. (Pepo is an ante-Linnæan name for the plant.)—The common field, pie and cattle pumpkin of N. Amer.; also the Vegetable Marrow. Var. *condensa*, Bailey. BUSH PUMPKIN. SUMMER SQUASH. Not running or tendrill-bearing, the plant compact. Here belong the summer crook-neck, scallop, pattypan and similar squashes, in many forms and colors of fr. Var. *ovifera*, Bailey. YELLOW-FLOWERED GOURDS. Plants running and slender, tendrill-bearing, the lvs. small and usually deeply lobed: fr. small, of many shapes and colors, with hard shell and mostly durable. Here are assembled the little pear-shaped, apple-shaped, egg-shaped, and other gourds grown for ornament and curiosity.

2. *C. moschata*, Duchesne. CUSHAW and WINTER CROOKNECK SQUASHES. Plant long-running, soft to the hand: lvs. limpish and velvety, not stoutly upright, usually broad-ovate to nearly circular-ovate in outline and not lobed, but sometimes lobed and much like No. 1 in shape, often with whitish marks and blotches: corolla with wide-spreading crinkly lobes, the tube broad at base and usually not bulging above; calyx-lobes often long and frequently expanded and lf.-like at the end; peduncle angled, widely expanded at fr.—The frs. are known both as pumpkins and squashes; they are autumn and winter products, including the Sweet Potato, Quaker Pie and Japanese Pie Pumpkins, and others.

3. *C. maxima*, Duchesne. AUTUMN and WINTER SQUASH. Plant long-running, rather soft to the hand: lvs. not rigid, moderately upright, orbicular or nearly so, not lobed, base cordate with very deep sinus, margins shallow-serrate with soft points: corolla with broad usually reflexed lobes, the tube with parallel sides or bulging toward the base; calyx-lobes short and narrow: peduncle short and cylindrical or enlarged at middle, often somewhat spongy, not expanded at attachment: fr. often glaucous.—The Hubbard, Boston Marrow, Turban squashes are of this species; also the Mammoth Chile and other immense frs. often seen at exhibitions, sometimes known as pumpkins.

4. *C. ficifolia*, Bouché. Extensively running, the sts. setose and harsh to the hand: lvs. circular-ovate to nearly reniform, 7-10 in. across, sinuate to lobed and with obtuse sinuses, the basal sinus broad and margined by the lateral ribs, margins apiculate-serrate: corolla with spreading large lobes, the tube broad and expanding upward; calyx-lobes very narrow and short: peduncle angled, expanded at attachment: fr. oblong or nearly globular, 6-12 in. long, green with white stripes, flesh white, rind hard and gourd-like; seeds black or nearly so. E. Asia; grown for its abundant foliage and ornamental frs.—The Malabar gourd is this species.

2. *SICANA*, Naud. A glabrous monœcious long-running vine is sometimes cult., differing from *Cucurbita* in the anthers being free although connivent; lobes of calyx and corolla short and reflexed; 1 or 2 other species are known, all from trop. Amer. (*Sica-na*: name in Peru.)

*S. odorifera*, Naud. CURUBA. CASSABANANA. Perennial: sts. angled, tendrils branched: lvs. large, nearly orbicular, 5-12 in. across, strongly lobed, cordate at base, margins angled or repand-toothed: fls. solitary, yellowish, staminate about  $\frac{3}{4}$  in. long, pistillate about 2 in. long with the slender ovary; stigmas 3, each 2-lobed: fr. long-oblong, 1-2 ft., nearly cylindrical, orange-crimson, with strong aroma. Probably Brazil, but spread elsewhere.—Grown mostly for its ornamental fragrant fr., which is also sometimes eaten.

3. *LUFFA*, L. - Seven or 8 species yielding edible, useful and ornamental frs., most of them (including ours) from the Old World tropics.—Monœcious



annuals, with 5-7-lobed lvs., nearly or quite glabrous, tendrils branched: fls. yellow or whitish, showy; staminate racemed, pistillate solitary and short- or long-peduncled; corolla of 5 petals; anthers free; ovary with 3 placentæ, the stigmas 3 and 2-lobed, ovules many: fr. long and cylindrical or short and clavate, from rind becoming dry and papery, not hairy, the interior fibrous. (Luf-fa: from *luff*, the Arabic name.)—The dried fibrous interior of the frs. is used as a sponge, whence the names Vegetable-Sponge, Dish-Cloth Gourd, Rag Gourd; young fr. sometimes eaten.

Ovary not ribbed and cornered, usually cylindrical and tomentose: lvs.

mostly deeply lobed.....1. *L. cylindrica*

Ovary ribbed and angled, mostly rather short and club-shaped and not tomentose: lvs. not deeply lobed.....2. *L. acutangula*

1. *L. cylindrica*, Roem. Strong vine, sts. slender and angled: lvs. deltoid to nearly circular in outline but pointed, 5-12 in. long, mostly 3-7-lobed, with close or open base, margins dentate, scabrous but not pubescent: fls. 2-4 in. across, light yellow: fr. nearly or quite cylindrical, 1-2 ft. long, straight or curved, usually with light furrows and stripes but not ribbed or angled; seeds flat, about  $\frac{1}{2}$  in. long, black or nearly so, smooth, margined.—The common species in cult. in this country, and escaped in American tropics.

2. *L. acutangula*, Roxb. Lvs. usually not so large, very scabrous, angled but not deeply lobed: fr. clavate, 6-12 in. long, strongly ridged; seeds thicker than in No. 1, flattish, about  $\frac{1}{2}$  in. long, black, reticulate or sculptured, not margined.

4. **BENINCASA**, Savi. Two annual vines of trop. Asia, one sometimes grown for the fr. which is eaten, mostly as conserves and pickles.—Monœcious: tendrils branched: fls. solitary, yellow, large and showy, the staminate long-peduncled and pistillate short-stalked or nearly sessile; corolla rotate, 5-parted to base; anthers free; ovary with 3 placentæ, stigmas 3, ovules many: fr. fleshy and without durable rind. (Beninca-sa: name of an Italian nobleman, patron of botany.)

*B. hispida*, Cogn. (*B. cerifera*, Savi). WHITE GOURD. CHINESE PRESERVING MELON. Long-running, with brown-hairy sts.: lvs. broad-ovate to reniform-ovate, 6-10 in. across, angled but not lobed, cordate at base with sinus bordered at top by the lateral ribs, margins dentate, hairy or becoming nearly glabrous: fls. 3-4 in. across: fr. nearly spherical to long-oblong, often 10-16 in. long, hairy and white-waxy; seeds about  $\frac{1}{2}$  in. long, smooth, white.

5. **LAGENARIA**, Ser. One variable long-running annual, probably native in Old World tropics but now wide-spread in warm countries and in cult.—Monœcious, or only rarely dioecious: fls. solitary, white, showy, perishing toward midday, 5-petalled; staminate on very long peduncles, often surpassing the foliage; anthers lightly cohering, but not connate; ovary long or short, with 3 placentæ, ovules numerous and horizontal: fr. of many sizes and shapes, with hard durable shell. (Lagena-ria: Latin *lagena*, a bottle, from the fr.)

*L. leucantha*, Rusby (*L. vulgaris*, Ser.). WHITE-FLOWERED GOURD. Musky-scented soft viscid-pubescent vine with branched tendrils: lvs. cordate-ovate to reniform-ovate, 6-12 in. across, not lobed or sometimes only indifferently so, broad-cordate at base, margins apiculate-dentate: fls. 2-4 in. across: fr. 3 in. to 3 ft. and more long, from disk-like to nearly globular and bottle-shaped, dumbbell-shaped, club-shaped, crooknecked and coiled, the shells used for utensils.—Here belong the dipper, sugar-trough, Hercules club and other gourds; also the calabash gourd, although the name calabash belongs with *Crescentia*.

6. **CITRULLUS**, Neck. Four species are recognized, all in trop. Afr. and 1 probably native also in Asia; one species widely grown for its edible fr.—Monœcious annuals or perennials, long-running, more or less hairy, with branched tendrils: lvs. deeply pinnatifid, the lobes again lobed: fls. of medium size, light yellow, solitary in the axils; corolla 5-parted nearly to base; anthers

free; ovary with 3 placentæ and many ovules, the stigmas 3. (*Citrullus*: diminutive of *Citrus*, in some allusion to the frs.)

**C. vulgaris**, Schrad. WATERMELON. Hairy annual: lvs. ovate to ovate-oblong in outline, 4-7 in. long, cordate at base, pinnately divided into 3 or 4 pairs of lobes and these again lobed and toothed, the segms. broad at the apex: peduncles much shorter than the lvs.: corolla about  $1\frac{1}{2}$  in. across, rotate, the 5 lobes obovate and obtuse: fr. globular or oblong, mostly glabrous, with a hard but not durable rind, striped green, and sweet red flesh; seeds white or black, flat, smooth. Trop. and S. Afr., spontaneous in warm countries.—A race with hard white flesh is the "citron" of households, used in the making of conserves.

**7. CUCUMIS**, L. Some 30 species of annuals and perennials, trailing or climbing, in warm countries, mostly African, a few grown for the edible and interesting frs.—Monœcious or rarely diœcious, mostly hairy; tendrils simple: lvs. entire or dissected: fls. yellow, not large, solitary but the staminate sometimes more than 1 in an axil, usually short-stalked and underneath the foliage; corolla open-bell-shaped to rotate, deeply 5-parted; anthers free; ovary with 3-5 placentæ and stigmas, many-ovuled, the style short: fr. fleshy and usually indehiscent, globular to elongated, glabrous, pubescent or echinate. (*Cucumis*: Latin name of a plant with cucumber-like odor.)

Fr. spiny, muricate or echinate.

Lvs. deeply lobed, with rounded sinuses.....1. *C. Anguria*

Lvs. not lobed or only shallowly so and with acute sinuses.

Mature fr. bur-like, beset with hairs, not edible.....2. *C. dipsaceus*

Mature fr. prickly or muricate, edible.....3. *C. sativus*

Fr. glabrous or only pubescent (sometimes somewhat warty).....4. *C. Melo*

1. **C. Anguria**, L. (*C. grossulariæformis*, Hort.). WEST INDIA or BUR GHERKIN. Slender rough-hairy trailing vine with angled sts. and small tendrils: lvs.  $1\frac{1}{2}$ - $3\frac{1}{2}$  in. long, with 3 prominent main lobes divided by sinuses with enlarged rounded bottoms, the lateral lobes usually again lobed, lobes broad and obtuse, margins apiculate, sinuate-serrate, very scabrous: fls.  $\frac{1}{8}$ - $\frac{1}{2}$  in. across, or the staminate sometimes broader, on slender peduncles: fr. oval or oblong, about 2 in. long, on crooked peduncles, furrowed, prickly, with very many small white smooth seeds. (*Anguria*: a Greek name for some cucurbitous fr.) Fla. and Tex. to S. Amer.; grown for curiosity and for use in pickles; the "gherkins" of mixed pickles, however, are usually young cucumbers.

2. **C. dipsaceus**, Ehrh. HEDGEHOG or TEASEL GOURD. Slender trailer with strongly setose angled sts.: lvs. much like those of *C. Melo*, broad-ovate to nearly reniform-ovate, 3-4½ in. across, not lobed, cordate at base, sinuate-serrate, setose and scabrous: fls. small, the staminate  $\frac{1}{2}$ -¾ in. across, on long peduncles: fr. a hard dry bristly oblong bur 1-2 in. long; seeds very small, flat, white. Arabia.—Grown for ornament and curiosity.

3. **C. sativus**, L. CUCUMBER. Trailing or climbing, rough-hairy, with strong angled sts.: lvs. triangular-ovate, 3-6 in. long, angled or somewhat 3-lobed and with acute or not rounded sinuses, the middle lobe pointed, very scabrous: fls. 1-1½ in. across; very short-pedicelled, the staminate often several in one axil, the corolla-lobes acute: fr. from nearly globular to oblong and elongated, prickly with sharp elevations; seeds small, flat, white. S. Asia.—Var. **anglicus**, Bailey, ENGLISH FORCING CUCUMBER, a group of cultivars with very strong and vigorous sts.: lvs. large and broad, rather short in proportion to breadth, sometimes 1 ft. long: fls. very large: fr. slender, sometimes 3 ft. long, little furrowed and nearly or quite spineless, producing few seeds.

4. **C. Melo**, L. MELON. MUSKMELON. Trailing or somewhat climbing soft-hairy vine with striate or angled sts.: lvs. orbicular-ovate to nearly reniform, 3-5 in. across, angled but usually not distinctly lobed, rounded at apex, margins sinuate-dentate, hairy and somewhat scabrous: fls. about 1 in. across, the staminate sometimes more than 1 in an axil, the corolla-lobes essentially obtuse: fr. various, in the usual forms globular or oblong, more or less furrowed, not spiny or echinate, pubescent but usually becoming glabrous, with a pronounced musky odor, usually with yellow or green flesh. (*Melo*: old Latin name for a form of melon.) Probably Cent. Asian; it has given rise to many races and cultivars.—Var. **reticulatus**, Naud. NETTED or NUTMEG MELONS. Frs. small with the surface net-ribbed. Var. **cantalupensis**, Naud. CANTALOUPE MELONS (from Cantaluppi, near Rome, where these

melons were early grown from S. W. Asian stock). Frs. with hard rinds, often furrowed, scaly, warty or rough. In N. Amer. the name cantaloupe is commonly improperly applied to muskmelons in general.

Var. *inodorus*, Naud. WINTER or CASSABA MELON (the latter a geographical name in S. W. Asia). Strong and long-tendrilled vines: lvs. large, often 8 in. and more long, sparsely hairy, sometimes deeply lobed: fls. often 2 in. across: fr. large, maturing late and keeping in winter, squash-like in shape and often striped and splashed, usually white-fleshed, with little musky odor and flavor.

Var. *flexuosus*, Naud. (*C. flexuosus*, L.). SNAKE or SERPENT MELON. Plant like *C. Melo* itself: fls. often larger, the ovary very long: fr. 18–40 in. long and 1–3 in. thick, furrowed, often crooknecked or coiled, slightly pubescent, the flesh white and cucumber-like, slightly acid. Fr. sometimes used in preserving, but raised mostly as a curiosity.

Var. *Conomon*, Makino (*C. Conomon*, Thunb.). ORIENTAL PICKLING MELON. Vine the stature of *C. Melo*, with setose-prickly sts.: lvs. on the ovate-oblong order, shallowly side-lobed and the middle lobe large and rounded, petioles setose: fls. large: fr. various in shape, smooth and glabrous, with longitudinal lines and perhaps somewhat furrowed, pale green, flesh white or green, not musky and not sweet, sometimes the fr. is oblong-cylindrical and slightly clavate, to 24 in. long and 6 in. thick, in other forms much shorter, again turban-shaped or constricted midway. (Conomon is from the Japanese *Konomono*, a food used with rice but principally prepared from the radish.)

Var. *Chito*, Naud. (*C. Chito*, Morr.). MANGO MELON. Stature of *C. Melo*, with setose-hairy sts.: lvs. as in *C. Melo*, except mostly smaller: fr. size and shape of orange or lemon, or sometimes oblong, yellow or greenish-yellow, not variegated nor fragrant, the flesh white and cucumber-like. (Chito is probably a geographical name.)—Frs. used in the making of preserves and pickles, under the names Mango, Orange Melon, Vegetable-Orange, Lemon-Cucumber, Melon-Apple, Vine-Peach.

Var. *Dudaim*, Naud. (*C. Dudaim*, L. *C. odoratissimus*, Moench). DUDAIM MELON. Small plant with hairy-setose slender angled sts.: lvs. ovate-oblong and unlobed, usually about 2 in. long but becoming 6 in. long: fls. relatively large: fr. size of a medium orange, somewhat oblate, longitudinally marbled with rich brown, very fragrant. (Dudaim, a Hebrew name, said to be scriptural.)—Grown for the ornamental perfumed fr.

8. **SECHIUM**, P. Br. (*Chayota*, Jacq.). One slender glabrous or sparsely hairy vine of trop. Amer., cult. for its edible fr.—Monœcious: tendrils large, branched: fls. small, the staminate in small peduncled clusters, pistillate shorter-stalked in the same axils; corolla cup-shaped to nearly rotate, deeply 5-lobed; anthers free, but the filaments, as well as the styles, connate: fr. fleshy, with 1 large seed. (Se-chium: name obscure.)

**S. edule**, Sw. CHAYOTE. CHRISTOPHINE. Roots tuberous: sts. annual, trailing and climbing: lvs. broad-ovate to triangular-ovate, 4–8 in. long, angled but scarcely or shallowly lobed, the points apiculate, margins entire: fr. mostly pyriform, 3–8 in. long, furrowed and wrinkled, green or whitish, at the end nearly closing over the single large flat seed which is 1–2 in. long.—Fr. much prized in trop. and sub trop. regions as a vegetable.

9. **COCCINIA**, Wight & Arn. (*Cephalandra*, Schrad.). Perennial trop. vines of Asia and Afr., usually with tuberous roots, one more or less grown for ornament.—Mostly dioecious: tendrils branched in ours: lvs. angled or lobed, sometimes glandular: fls. large, white or yellowish, solitary or clustered; corolla bell-shaped, lobed to middle; ovary with many ovules on 3 placenta: fr. small, berry-like, oblong or cylindrical, often highly colored. (Coccin-ia: Latin scarlet.)

**C. cordifolia**, Cogn. (*C. indica*, Wight & Arn.). Sts. slender, long-running and -climbing, furrowed, glabrous: tendrils simple: lvs. triangular-ovate, 2–3 in. across, angle-lobed but not deeply so, cordate at base, sinuate-serrulate: fls. white, slender-peduncled, about  $1\frac{1}{2}$  in. long, with acute flaring corolla-lobes: fr. 1–2 in. long, scarlet. S. E. Asia.

10. **TRICHOSANTHES**, L. Annual and perennial herbs, perhaps woody at base, sometimes with tuberous roots, in the tropics of Asia, Polynesia and

Australia, one frequently grown for ornament and food.—Monœcious or diœcious: tendrils mostly branched: lvs. entire or lobed: fls. white, the staminate racemose; corolla rotate or cup-shaped, the petals or lobes 5 and laciniate; stamens 3; ovary 1-celled, with many ovules on 3 placentæ: fr. fleshy, short or elongated. (Trichosan-thes: Greek *hair-flower*, from the fimbriate corolla.)

**T. Anguina**, L. (*T. colubrina*, Jacq.). SERPENT or SNAKE GOURD (Latin *anguis*, serpent.) Long-running or -climbing annual, with slender angled short hairy sts.: tendrils branched: lvs. broad-ovate to triangular-ovate, 4-9 in. long, shallowly 3-lobed or unlobed, deeply and broadly cordate at base, margins sinuately apiculate-dentate, nearly or quite glabrous: fls. long-peduncled and showy, 2 in. or more across: fr. 1-6 ft. long, very slender, long-tapering to the point, variously curved or coiled, glabrous, greenish-white; seeds about  $\frac{1}{2}$  in. long, thick, scalloped on the edges, brownish. India; grown for the curious fr., which is also sometimes eaten.—The name "snake gourd" is sometimes applied to forms of *Lagenaria*.

**11. MOMORDICA**, L. Annual and perennial climbing herbs of 35-40 species in trop. Afr. and Asia, two commonly cult. for ornament and somewhat for food.—Monœcious or diœcious: tendrils simple or forked: lvs. simple or compound: pistillate fls. solitary, yellow or sometimes white, the staminate solitary or paniced (solitary in ours), peduncle in ours bearing a prominent broad bract; corolla rotate or open-bell-shaped, mostly parted nearly to the base; anthers free; ovary with 3 placentæ, the stigmas 3 and sometimes 2-lobed: fr. oblong or nearly spherical, small or large, often spiny-tuberculate, usually indehiscent but sometimes splitting at maturity into 3 valves. (Momor-dica: Latin *mordeo* to bite, the seeds sometimes jagged as if bitten.)—Ours are porch vines and run wild in warm countries.

Bract serrate, on the sterile peduncle placed on the upper part. . . . . 1. *M. Balsamina*

Bract entire, at the middle or base of peduncle. . . . . 2. *M. Charantia*

**1. M. Balsamina**, L. BALSAM-APPLE. Very slender but high-climbing glabrous monœcious annual with simple tendrils: lvs. thin and glabrous, cordate-orbicular to broadly triangular-ovate in outline, 2-4 in. across, 3-5-lobed with broad or rounded sinuses and pointed-toothed: fls. yellowish and usually with darker center, the staminate 1-1  $\frac{1}{4}$  in. across and on slender peduncles, the pistillate smaller and usually on shorter stalks; bract shield-like, serrate, well toward the top of the staminate peduncle: fr. ovoid or ellipsoid, 1  $\frac{1}{2}$ -3 in. long, narrowed to both ends, with points or prominences (sometimes nearly smooth), orange; seeds elliptic, about  $\frac{1}{2}$  in. long, thick but flat, gray or brown, somewhat scalloped on edges and pattern-veined. (Balsamina is an herbalist's name adopted by Linnæus.) Old World tropics.

**2. M. Charantia**, L. BALSAM-PEAR. Mostly a longer vine than No. 1, annual, with larger more deeply lobed lvs., the margins sinuate and with apiculate points: bracts entire, at the base or not above the middle of the peduncle: fr. oblong or oval and narrowed both ways, 4-8 in. long, orange-yellow, covered with blunt warts, bursting at maturity and showing the scarlet arils; seeds about  $\frac{1}{2}$  in. long, cornered at the ends, thick but flat, light gray or brown, with prominent patterns. (Charantia: herbalist's name, used by Dodonæus.) Old World tropics; an ingredient of curries with some peoples, and used medicinally.

**12. ABOBRA**, Naud. A single species in extra-trop. S. Amer., sometimes grown under glass for its ornamental frs.—Diœcious, with small green axillary solitary fragrant fls. and mostly forked tendrils: corolla rotate, 5-parted, woolly within; anthers free; ovary 3-4-celled, with 2 erect ovules in each cell: fr. ovoid and berry-like. (Abo-bra: Brazilian name.)

**A. tenuifolia**, Cogn. (*A. viridiflora*, Naud.). Perennial with fleshy root and herbaceous sts., 10-30 ft.: lvs. broad-ovate in outline, 2-5 in. long and about as broad, cut into linear divisions, more or less white-punctate: fr. smooth, about  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, becoming carmine.

**13. CYCLANTHERA**, Schrad. Thirty and more species in warm and trop. Amer., annuals and perennials, one reaching far north as Kans.; one of them



is grown sometimes as an arbor or veranda vine.—Monœcious annual and perennial herbs with simple or branched tendrils, mostly glabrous: lvs. usually lobed or palmate: fls. small, white or greenish, the pistillate solitary and staminate racemose or paniculate; corolla rotate, 5-parted; ovary commonly 3-celled, with 2 or more ovules in each cell; style short, stigma large and circular: fr. ovoid and oblique, usually spiny, beaked, elastically dehiscent. (Cyclanthera: Greek *circle anther*.)

**C. pedata**, Schrad. Annual strong-smelling vigorous glabrous vine with branched tendrils: lvs. pedately parted to the base, with 5-7 lance-oblong dentate parts or lfts. and the lateral ones again lobed or parted: fls. small and inconspicuous: fr. elliptic-oblong, about 2 in. long, soft-prickly, yellowish-white, short-stalked; seeds  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, flat, jagged, blackish. Mex., Cent. Amer.; quickly covers fences and screens.

14. **ECHINOCYSTIS**, Torr. & Gray (*Micrampelis*, Raf.). About 25 annual and perennial species in N. and S. Amer., one offered by seedsmen as a screen and veranda vine.—Monœcious, with branched tendrils and lobed or angled lvs.: fls. white or whitish, mostly small but often profuse, the staminate racemose or paniculate and the pistillate usually solitary; corolla rotate, deeply 5-parted; anthers variously coherent; ovary mostly 2-celled or 1-celled with 2 placenta, ovules erect and 2 in each cell: fr. fleshy or dry, sometimes bladdery, not large, opening at the top. (Echinocystis: Greek *hedgehog and bladder*.)

**E. lobata**, Torr. & Gray. WILD CUCUMBER. Annual: sts. slender, angled, glabrous or hairy at nodes, reaching 20 ft. or more: lvs. cordate-ovate, 3-5 in. long, 3-7-lobed less than to middle, lobes apiculate, margins entire or sparsely serrate: staminate fls. numerous in long compound axillary racemes: fr. short-oblong,  $1\frac{1}{2}$ –2 in. long, puffy, with slender weak spines; seeds  $\frac{1}{2}$ – $\frac{5}{8}$  in. long, brownish, nearly plain. Thickets N. B. to Man. and Tex.

15. **BRYONIA**, L. BRYONY. Perennial herbs, 10-12 species, mostly in Eu., one sometimes sold by seedsmen as a cover vine.—Mostly diœcious, with simple or forked tendrils, and angled or lobed lvs.: fls. rather small, the staminate in peduncled racemes or cymes, the pistillate solitary or in short axillary clusters; corolla rotate or open-bell-shaped, 5-parted; anthers free; ovary with 3 placenta, the 3-parted style slender, stigmas simple or 2-lobed; ovules horizontal: fr. a spherical berry. (Bryonia: Greek *to sprout*, referring to the shoots that come annually from the tuber.)

**B. dioica**, L. Strong-climbing from tuberous roots, with simple tendrils: lvs. scabrous, cordate-ovate or broader, 3-5 in. across, 3-5-lobed, lobes sharp-pointed or apiculate, margins sinuate or obscurely toothed: corolla greenish,  $\frac{3}{4}$  in. or less across: fr.  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., red, with few small brownish seeds. Eu. and W. Asia.

16. **MELOTHRIA**, L. If defined broadly, probably 70 species, native in the warmer parts of both hemispheres; annuals and perennials; seed of one is offered as an ornamental vine.—Monœcious, at least in ours which also has simple tendrils: lvs. entire or lobed: fls. small, the staminate racemose or corymbose, pistillate solitary or clustered; corolla rotate or short-bell-shaped, deeply 5-parted; anthers very unequal; ovary contracted beneath the corolla, with 3 placenta, and many horizontal ovules; style short, stigmas mostly 3: fr. small and berry-like, glabrous or warty. (Melothria: old name, not satisfactorily explained.)

**M. scabra**, Naud. Slender climber, with lightly hairy angled or grooved sts.: lvs. triangular-ovate, 2-4 in. long, shallowly 3-5-lobed, rather deeply cordate, margins remotely apiculate, scabrous above, light-hairy on veins beneath: fls. very small, slender-peduncled, the staminate 3-7: fr. ovoid to short-oblong,  $\frac{3}{4}$ –1 in. long, glabrous, more or less green-spotted; seeds dull white, small and smooth. Mex.

17. **ECBALLIUM**, A. Rich. **SQUIRTING-CUCUMBER**. One trailing perennial in the Medit. region, without tendrils, grown for its odd frs.—Monœcious: fls. yellow, pedunculate, pistillate solitary and often in the same axil with the staminate raceme; corolla rotate or open-bell-shaped, deeply 5-parted with acute lobes; anthers free; ovary long, with 3 placentæ and many ovules, the style very short and bearing 3 bifurcate stigmas. (*Ecballium*: Greek *to eject*, from the fr.)

**E. Elaterium**, A. Rich. (*Momordica Elaterium*, L.). Hairy-pubescent: lvs. triangular-ovate, 3–4 in. long, broadly cordate, angled or somewhat obscurely lobed, margins sinuate, gray-tomentose beneath: fls. 1 in. across: fr. oblong, 1½–2 in. long, rough-hairy, greenish, at maturity detaching from the peduncle and squirting the brownish seeds from the point of attachment. (*Elaterium*: old substantive, associated with Greek *to drive*.)

## 165. CAMPANULACEÆ. BELLFLOWER FAMILY

Herbs as usually known to cultivators, but sometimes shrubs and even trees, about 1,000 species in some 40 genera, of wide distribution in trop. and temp. regions; the family yields many choice ornamentals.—Cult. species erect but others climbing, mostly with milky juice: lvs. usually alternate, exstipulate, simple and only rarely much lobed or divided: fls. bisexual and regular or nearly so, solitary, spicate, racemose or paniculate, prevailingly blue but sometimes white, the gamopetalous corolla 5-lobed or -divided; calyx-tube adnate to ovary, the limb 5-lobed, usually persistent on the fr.; stamens 5, inserted on calyx-rim or slightly on corolla base, the filaments separate or united, sometimes dilated at base; ovary inferior in the genera here included, mostly 2–5-celled and with axile placentæ, or 1-celled with 2 parietal placentæ, the ovules many; style 1, stigmas sometimes several: fr. in ours a dehiscent caps. *K*, Fig. 13, page 684.—Aside from the genera here regularly treated, the two following may be expected in collections:

**PHYTEUMA Scheuchzeri**, All. Perennial to 12 or 16 in. high, with long-lanceolate to triangular-oblong serrate lower lvs., and long narrow st.-lvs., and dense globular heads 1 in. diam. of violet-blue fls., with narrow subtending bracts exceeding the head; the corolla is long-tubular and curved, at first splitting at the base and disclosing the stamens. *S. Eu.*

**WAHLENBERGIA gracilis**, Schrad. (*W. vincaeflora*, Decne.), a ground-cover or tufted plant 6–12 in. high with linear-lanceolate dentate lvs. about ½ in. long, and blue campanula-like fls. about ½ in. long on long peduncles. *New Zeal., Australia, S. Afr.*

Caps. closed at the top but opening on the sides or at base by lids or small separate valves.

Ovary hemispherical or top-shaped.

Anthers distinct.

Style not surrounded by a fleshy disk.....1. **CAMPANULA**

Style surrounded by or immersed in a fleshy disk.....2. **ADENOPHORA**

Anthers connate into a tube.....3. **SYMPHYANDRA**

Ovary linear or narrowly oblong.....4. **SPECULARIA**

Caps. opening by valves at the apex.....5. **PLATYCODON**

1. **CAMPANULA**, L. **BELLFLOWER**. Sometimes annuals and biennials, but mostly perennial herbs, of some 250 species largely in the northern hemisphere, chiefly in *Eu.*; many of them are choice garden plants.—Often tufted: root-lvs. frequently unlike the st.-lvs., the latter sometimes few: genus specially known by the pod ovoid or turbinate and dehiscent below the persistent calyx-rim by pores or separate valves, the clavate style not surrounded by a fleshy disk, corolla bell-shaped to rotate and 5-toothed or -lobed and not split at base or otherwise, fls. solitary, spicate, racemose, paniculate, not in compact composite-like heads; stamens usually dilated at base; stigmas 3 in ours except *C. Medium*, and caps. 3-celled: caps. opening near the base in some species,

near the top in others. (Campan-ula: Latin *little bell*.)—Some of the smaller species are used in rock-gardens but they are not usual plants in this country and are not entered here.

- A. Style 1 in. or so long and long-exserted: annual..... 1. *C. macrostyla*  
 AA. Style much shorter, mostly included.  
 B. The drooping campanulas, in which the fls. are habitually nodding or strongly declined (not to be confused with those, like No. 10, in which very heavy fls. tend to fall over or sag).  
 C. Calyx with an appendage at base of each sinus.  
 D. St. and under side of lvs. tomentose or soft-pubescent: fls. white..... 2. *C. alliarizæfolia*  
 DD. St. and lvs. only hairy or lightly pubescent.  
 E. Basal lvs. broadly cordate-ovate..... 3. *C. punctata*  
 EE. Basal lvs. lance-oval..... 4. *C. longestyla*  
 CC. Calyx without appendages.  
 D. Lvs. fleshy, viscid..... 5. *C. Vidalii*  
 DD. Lvs. otherwise.  
 E. Corolla bearded or at least hairy inside the lobes.  
 F. Fls. 1 in. or so long..... 6. *C. Trachelium*  
 FF. Fls. 2 in. or more long..... 3. *C. punctata*  
 EE. Corolla not bearded.  
 F. St.-lvs. of the ovate kind.  
 G. Fls. in a long one-sided raceme..... 7. *C. rapunculoides*  
 GG. Fls. not secund, in a short infl..... 8. *C. rhomboidalis*  
 FF. St.-lvs. linear or grass-like.  
 G. Plant weak, with few fls..... 9. *C. rotundifolia*  
 GG. Plant stout and tall, terminated by long racemes..... 12. *C. persicifolia*  
 BB. The erect-fl. campanulas, in which the blossoms are normally erect on the st. or strongly ascending (although the plant itself may be drooping).  
 C. Calyx with appendage at base of each sinus..... 10. *C. Medium*  
 CC. Calyx lacking appendages.  
 D. Plants strong or clumpy perennials.  
 E. St.-lvs. large, on the oblong order..... 10. *C. Medium*  
 EE. St.-lvs. linear or at most lance-linear.  
 F. Lobes of calyx filiform..... 11. *C. Rapunculus*  
 FF. Lobes  $\frac{1}{2}$  in. or more broad, flat..... 12. *C. persicifolia*  
 EEE. St.-lvs. ovate or on that order (narrow in No. 13).  
 F. Habit erect, at least as to fl.-sts.  
 G. Lobes of corolla bearded..... 6. *C. Trachelium*  
 GG. Lobes not bearded.  
 H. Corolla broadly or open-bell-shaped to almost saucer-shaped.  
 I. Cauline-lvs. sessile or essentially so..... 13. *C. latiloba*  
 II. Cauline-lvs. long-petioled.  
 J. Fls. in elongated racemes..... 14. *C. pyramidalis*  
 JJ. Fls. terminating long peduncles..... 15. *C. carpatia*  
 HH. Corolla bell-shaped to tubular.  
 I. Fls. in dense globular terminal and axillary subtended heads..... 16. *C. glomerata*  
 II. Fls. racemose or long-spicate.  
 J. Blossoms mostly above 1  $\frac{1}{4}$  in. long, normally rich blue; lower lvs. subcordate..... 17. *C. latifolia*  
 JJ. Blossoms 1 in. long, normally white or pale blue; lvs. not subcordate..... 18. *C. lactiflora*  
 FF. Habit trailing or decumbent; low diffuse plants.  
 G. Corolla narrow-bell-shaped..... 19. *C. Portenschlagiana*  
 GG. Corolla very broad and open, rotate or saucer-shaped.  
 H. Width of corolla  $\frac{3}{4}$  in. or less; lobes narrow..... 20. *C. garganica*  
 HH. Width 1 in. or more; lobes wide..... 21. *C. isophylla*  
 DD. Plants little flower-garden annuals.  
 E. Corolla nearly rotate..... 22. *C. ramosissima*  
 EE. Corolla bell-shaped..... 23. *C. drabifolia*

1. *C. macrostyla*, Boiss. & Heldr. Hispid branching annual, 1–2 ft.: lvs. ovate-oblong, 1–2 in. long, the upper ones ovate-lanceolate, all sessile and more or less clasping, margins entire or remotely denticulate: fls. solitary and erect on stout peduncles, 2–2 $\frac{1}{2}$  in. across, the corolla broad and open, dull purple and violet-marked within, pale purple without; calyx strongly appendaged, the lobes long-pointed and nearly or quite equaling the corolla; stigmas long-protruded, nearly or quite 1 in. long. Taurus Mts., Asia Minor.

2. *C. alliarizæfolia*, Willd. Erect perennial, 1 $\frac{1}{2}$ –2 ft., more or less woolly-pubescent, branching at top: basal lvs. large, ovate-cordate to reniform, long-petioled, crenate, pubescent above and tomentose beneath; st.-lvs. ovate and

smaller, becoming sessile: fls. white, nodding on short stalks in the upper axils; calyx-lobes ovate and leafy, appendaged; corolla rather broad-campanulate, ciliate on margins, with a projection at the bottom of each sinus. Caucasus, Asia Minor.

3. *C. punctata*, Lam. (*C. nobilis*, Lindl.). Stout hairy erect perennial, 1-2 ft., with angled st. and many slender erect branches: basal lvs. broadly cordate-ovate, 3-5 in. long and long-petioled, sinus narrow, margins crenate- or blunt-dentate; st.-lvs. ovate to lance-ovate, sessile near the top: fls. declined from the tops of branches or stout peduncles, about 2 in. long, white to light clear lilac and mostly spotted within; corolla long-bell-shaped, lobed to about one-third the depth, ciliate with long soft hairs; calyx with an ovate appendage reflexed from each sinus or the appendage wholly wanting in some forms or departures. Siberia, China, Japan. —Now frequent in cult., particularly in the lilac-blue unspotted form or derivative Marian Gehring.

4. *C. longestyla*, Fomine. More or less hairy branching perennial, 18-30 in.: basal lvs. lance-oval and lobed, with long winged petiole; st.-lvs. oblong and sessile: fls. hanging, blue-purple; calyx-lobes lanceolate-pointed and divaricate; appendages reflexed on the peduncle; corolla nearly urn-shaped, constricted below the limb or in one form bell-shaped. Caucasus.

5. *C. Vidalii*, H. C. Wats. Clammy glabrous glossy-stemmed perennial, 1-2 ft., branching from base: lvs. oblong to oblong-spatulate, 3-4 in. long, fleshy and viscid, coarsely serrate: fls. nodding, 2 in. long, in a short terminal raceme, white with yellow at the very base; calyx-lobes thick, triangular; corolla tubular and constricted above the base. Azores, where it was discovered the middle of last century by Capt. Vidal, R. N.

6. *C. Trachelium*, L. Variable erect perennial, 2-3 ft., more or less rough-hairy; sts. usually simple, hairs mostly retrorse: lvs. ovate-lanceolate, 2-3 in. long, the lower ones long-stalked, cordate to truncate, acuminate, margin coarsely serrate, hispid-hairy at least on the veins: fls. blue-purple but running to other shades and to white, 1 in. long more or less, more or less inclined or drooping when fully open, 1-3 on a peduncle combined in a terminal loose raceme or panicle; corolla broad-campanulate, the lobes acute and not much spreading and more or less bearded; calyx-tube usually hispid, the lobes ovate-lanceolate, much shorter than corolla. (*Trachelium*: Greek *the neck*, supposed to cure diseases of the trachea; an old generic name.) Eu., Asia, and escaped in this country; double-fl'd. forms are known.

7. *C. rapunculoides*, L. The commonest introduced campanula, making large patches by means of its slender rootstocks and thickened roots, persisting about houses and along roadsides, the colonies sometimes producing few fls., but seldom really cult.; sts. slender but erect, 2-3 ft. and more, glabrous or pubescent: root-lvs. long-petioled, cordate-ovate, 1-3 in. long; st.-lvs. lance-ovate, 3-4 in. long, short-petioled to sessile, long-acuminate, irregularly serrate: fls. blue, 1 in. long or a little more, nodding on short pedicels in a long one-sided terminal raceme; calyx-lobes, turning back; lobes less than one-half depth of corolla, acute. Eu., Asia.

8. *C. rhomboidalis*, L. Perennial with erect slender angled glabrous or slightly hairy sts., 1-2 ft.: lvs. ovate and acute, 1-2 in. long, sessile or very short-petioled, dentate or serrate, with a few scattered hairs: fls. purplish-blue (a white var.),  $\frac{3}{4}$ -1 in. long, usually drooping, in a slender terminal raceme of 8-10; calyx strongly ribbed, with subulate lobes nearly or quite half as long as the bell-shaped rather shallow-lobed corolla. Mts. of Eu.

9. *C. rotundifolia*, L. BLUEBELL. HAREBELL. Very slender perennial 6-20 in. and more high, glabrous but with pubescent forms, often diffuse at base: root-lvs. broadly ovate to nearly orbicular (whence the name *rotundifolia*), about 1 in. across, long-petioled, often disappearing by flowering time; st.-lvs. linear and grass-like, 2-3 in. long, or the lower ones lanceolate: fls. few to several (or even solitary), in an open terminal raceme with the lower filiform pedicels elongated, hanging, bright blue (a white var. known in cult.),  $\frac{1}{2}$ -1 in. long; calyx-lobes awl-shaped, one-half as long more or less as the broad-bell-shaped rather shallow-lobed corolla. Eurasia, N. Amer., in many forms.—Var. *soldanellæflora*, Nichols., is semi-double with the corolla split to the base into many narrow shreds.

10. *C. Medium*, L. CANTERBURY BELLS. Stout erect hispid-hairy biennial,  $1\frac{1}{2}$ -3 or 4 ft.: root-lvs. oblanceolate or somewhat broader, long-tapering to base, 6-10 in. long, crenate; st.-lvs. lance-oblong, 3-5 in. long, sessile and more or less clasping, crenulate and undulate: fls. erect or ascending, 1 or 2 together on stout peduncles in a long open terminal raceme, violet-blue but now in many shades; calyx with broad-lanceolate lobes one-fourth or one-third length of corolla and bearing large reflexed broad-cordate appendages; corolla inflated bell-shaped or



urn-shaped, the tube in cult. plants 1 in. diam., the lobes short and flaring or somewhat reflexed; stigmas 5, and caps. normally 5-celled. (Medium: *middle-size*; a Tournefortian substantive adopted by Linnaeus.) S. Eu.—The most popular of the bellflowers and now represented in many cultivars, with fls. white, pink, and various shades, and also double. Var. *calycanthema*, Nichols. (i. e. *calyx-flowered*), has the calyx developed into an outer corolla-like organ, of the same color as corolla, the appendages disappearing. Of this there are two forms, each in different colors: one with outer corolla flaring or rotate, the Cup-and-Saucer race; one with the outer corolla bell-shaped, nearly or quite as long as the regular corolla and duplicating it, the Hose-in-Hose or Duplex race.

11. *C. Rapunculus*, L. RAMPION. Biennial, perhaps also perennial, slender, erect, glabrous, 2-3 ft., the many branches strongly ascending, making a thick tap-root the first year which is sometimes used in autumn and winter, together with lvs., as salad: radical lvs. many, 4-8 in. long, the blade oval or elliptic and tapering into long petiole, margins crenulate; main st.-lvs. linear-lanceolate, long-pointed, sessile, nearly or quite entire: fls. erect or ascending, lilac, about  $\frac{1}{2}$  in. long, in long erect narrow racemes; calyx-lobes subulate, nearly as long as the open-bell-shaped acute-lobed corolla. (Rapunculus: herbalists' name, diminutive from *rapum*, turnip.) Eu.—Seldom grown in this country as a garden vegetable; good roots are unbranched above, 2-3 in. long and  $\frac{1}{4}$  in. thick at top.

12. *C. persicifolia*, L. Strong erect perennial, making many basal lvs., glabrous; sts. 2-3 ft., sometimes branching toward the top: radical lvs. narrowly oblanceolate, 4-8 in. long, long-tapering below, nearly or quite obtuse, crenulate, glabrous; st.-lvs. not numerous, linear-lanceolate to linear, 2-4 in. long, the lower more or less spatulate, sessile, mostly acuminate, finely crenulate: fls. erect, short-stalked and more or less remote, in an elongated terminal raceme, blue to white, 1-1 $\frac{1}{2}$  in. long and often broader (very large in var. *macrantha*, A. DC.); calyx glabrous or hairy, the lobes linear-lanceolate, one-half or less the length of the broad open corolla which has broad mostly acute lobes. (Persicifolia; *peach-leaved*, not a very appropriate name.) Eu.—An old favorite, in several colors and forms, sometimes under Latin names.

13. *C. latiloba*, A. DC. (*C. grandis*, Fisch. & Mey.). Perennial, 1 $\frac{1}{2}$ -4 ft., with glabrous terete but furrowed simple sts.: st.-lvs. lanceolate, 3-5 in. long and  $\frac{1}{2}$  in. or less broad, narrowed both ways, crenate-serrate: fls. blue (a white var.), often 2 in. across, sessile, solitary or somewhat fascicled, erect, in a terminal panicle; calyx-lobes ovate-acute, less than half as long as the open-bell-shaped broad-lobed corolla; 3 styles very long. Caucasus.

14. *C. pyramidalis*, L. CHIMNEY BELLFLOWER. Strict strong glabrous perennial, 4-5 ft. (there is a dwarf compact form), nearly or quite simple but with many short flowering branchlets; main st. thick, pithy or hollow: radical lvs. very long-petioled, cordate-ovate, about 2 in. long, glandular-dentate; lower st.-lvs. much like the radical, upper ones narrowly ovate-acute: fls. numerous in a long narrow racemose terminal panicle, erect, pale blue and varying to white, producing a rocket-like effect; calyx-lobes nearly or quite linear, much spreading, usually not equaling the corolla-tube; corolla open and saucer-shaped, the acute lobes reaching to middle or below. S. Eu.

15. *C. carpatica*, Jacq. Variable and well known glabrous and smooth perennial forming a clump, with sts. more or less decumbent or spreading at base and rising 9-18 in.: basal and cauline lvs. similar but the lower ones longer-petioled, ovate, 1-1 $\frac{1}{2}$  in. long, subcordate to truncate at base, short-pointed, crenate-dentate: fls. solitary and erect on long sts. or peduncles, bright blue (and a white var. and shades of blue to mauve), 1 to nearly 2 in. across; calyx-lobes linear-acute, reflexed, short; corolla open-bell-shaped, broadly lobed to one-third or one-half the depth, the lobes acute. Carpathian region, E. Eu.—Var. *turbinata*, Nichols. (*C. turbinata*, Schott) has fls. more deeply bell-shaped or top-shaped, and decumbent habit. There are a number of other named vars.

16. *C. glomerata*, L. Strict hairy or glabrous perennial with erect side branches, 1-2 ft.: lvs. rather thick, scabrous and rugose and more or less hairy, the radical ones very long-petioled, narrowly cordate-ovate, 4-5 in. long, obtuse, crenate; st.-lvs. ovate to ovate-oblong, 3-4 in. long, mostly sessile and more or less clasping, obtuse or short-acute, irregularly crenate-serrate: fls. many in dense clusters in the axils and terminating main st. and side branches, blue but varying to white and sometimes double in the cultivars; calyx-lobes linear, erect, shorter than corolla-tube; corolla 1 in. or less long, rather narrow-bell-shaped, with acute flaring lobes about one-half its length. Eurasia, and somewhat escaped in this country; several vars. are known in cult.

17. *C. latifolia*, L. Strong early-blooming perennial, 3-4 ft.; sts. nearly simple and usually with scattered hairs: lvs. oblong-ovate to lance-ovate, the lower ones long-petioled and subcordate and 5-6 in. long, upper ones shorter-petioled and becoming narrower, all acuminate, dentate, rugose and hairy: fls. solitary, erect or ascending in a rather short leafy terminal raceme, about  $1\frac{1}{4}$ - $1\frac{3}{8}$  in. long, purplish-blue (and a white var.); calyx-lobes broad-linear and acute, ascending, about  $\frac{1}{2}$  in. long; corolla narrow-bell-shaped, the lobes about one-third its length. Eurasia.—Var. *macrantha*, Sims, is a large-fl. form, the corolla 2-2 $\frac{1}{4}$  in. long; plant usually taller.

18. *C. lactiflora*, Bieb. Perennial, 2-4 ft. and more, the sts. with a few declined hairs and branching above: lvs. oval-oblong to ovate-lanceolate, st.-lvs. 2-3 in. long, sessile, short-acute, serrate: fls. in a terminal panicle 3-4 in. long, milk-white but varying to pale blue, about 1 in. long and somewhat broader; calyx-lobes ovate, veined, more or less hispid; corolla open-bell-shaped to nearly saucer-shaped. Caucasus region.

19. *C. Portenschlagiana*, Roem. & Schult. (*C. muralis*, Porten.). Diffuse plant with erect puberulent fl.-sts. 6-9 in. high: lvs. all much alike, long-petioled, nearly orbicular to reniform, 1 in. or less across, strongly notch-toothed, usually somewhat puberulent: fls. 1-3 on ascending peduncles forming a raceme-like infl., usually under 1 in. long, and  $\frac{1}{2}$ - $\frac{3}{4}$  in. across (sometimes  $1\frac{1}{2}$  in. across in var. *major*), blue-purple; calyx-lobes linear, hairy, one-third or less the length of the narrow-bell-shaped short-lobed corolla. Dalmatia, where it was early collected by Portenschlag.

20. *C. garganica*, Ten. Little perennial with trailing or pendulous branches to 10 in. long, essentially glabrous although there is a villous form: lvs. much as in No. 19 but more ovate in shape: fls. rotate, about  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, blue, the stamens and style exserted; corolla-lobes narrow and long-pointed. Italy and Dalmatia; described from plants collected on Mt. Gargano.

21. *C. isophylla*, Moretti. Perennial with glabrous or hairy diffuse st. a few in. high, the many weak long flowering branches drooping: lvs. shortly cordate-ovate, 1-1 $\frac{1}{2}$  in. long and broad, long-petioled below, point very short, margins dentate, the upper ones becoming narrower and smaller: fls. solitary on bracted branchlets, profusely borne toward the end of the sts., pale blue (but a white var.), 1 in. or more across; calyx-lobes lanceolate and prominent, wide-spreading or reflexed, equaling or exceeding corolla-tube; corolla saucer-shaped, the lobes broad and acute, style long-exserted. Italy; a floriferous and attractive plant.

22. *C. ramosissima*, Sibth. & Sm. (*C. Loreyi*, Poll.). Annual, erect, 6-12 in., glabrous or somewhat hairy, branched above: lower lvs. obovate to ovate-lanceolate, crenate, nearly glabrous, obtuse; upper lvs.  $\frac{3}{4}$ -2 in. long, lanceolate or narrower, acute: fls. solitary on long erect peduncles, violet with lighter base (a white var.), 1 in. or more across; calyx hairy at base, the lobes narrow and long-acuminate and about equaling or even exceeding the nearly rotate or saucer-shaped corolla. S. E. Eu.

23. *C. drabifolia*, Sibth. & Sm. (*C. attica*, Boiss.). Annual, somewhat erect, much branched, 3-6 in. high, hispid: lvs. hairy, elliptic-oblong and dentate toward apex, somewhat lobed, most of them less than  $\frac{1}{2}$  in. long, lower ones tapering to base: fls. pedicellate; corolla open-bell-shaped,  $\frac{1}{2}$  in. or less long, with a white glabrous tube and blue pilose limb; calyx-lobes narrow, erect. Greece, Asia Minor.

2. ADENOPHORA, Fisch. Upwards of 40 perennial herbs in Eu. and Asia, differing from Campanula in the cup-like or cushion-like disk or gland surrounding the base of the style, the stamens free from the corolla and filaments dilated and usually ciliate toward base; stigmas and cells of caps. 3. (Adenoph-ora: Greek *gland-bearing*.)

Calyx-lobes denticulate to entire.....1. *A. lilifolia*  
Calyx-lobes laciniate or lobed.....2. *A. Potanini*

1. *A. lilifolia*, Ledeb. (*A. communis*, Fisch.). Erect, 2-3 ft., sts. leafy below: radical lvs. round-ovate and petioled, crenate-dentate; st.-lvs. ovate-lanceolate and sessile, serrate, all either glabrous or somewhat pilose: fls. many in a pyramidal panicle, pale blue, fragrant, about  $1\frac{1}{4}$  in. long, inclined; calyx-lobes narrow, denticulate, much shorter than the bell-shaped rather shallow-lobed corolla. Eu., Asia.

2. *A. Potanini*, Korsh. Sts. erect from a more or less ascending base, with fine appressed hairs: lvs. ovate-lanceolate to lanceolate, 1-2 in. long, with few large

teeth to nearly entire, close-hairy at least on margins and nerves beneath: fls. in a simple raceme, blue, about  $\frac{3}{4}$  in. long; calyx-lobes pinnately cut; corolla broad-bell-shaped. W. China; collected in 1885 by Potanin.

3. **SYMPHYANDRA**, A. DC. About 8 perennial and biennial herbs from the E. Medit. region and 1 reported from Korea; differing from *Campanula* in having the anthers united in a tube around the style (whence *Symphyan-dra*, *anthers grown together*); stigmas and cells of caps. 3.

**S. Hofmanni**, Pant. Sts. branched, 1-2 ft., hispid-hairy, perennial said sometimes to be biennial: lvs. oblanceolate to obovate, 4-7 in. long on the lower part and tapering to long winged base, shorter and becoming sessile on the upper part, toothed, hairy: fls. in terminal leafy panicles, white, drooping, 1-1½ in. long and of similar breadth; calyx-lobes auricled at base, leafy, half or more length of corolla-tube; corolla open-bell-shaped, shallowly broad-lobed, somewhat hairy inside; stigmas 3, exserted. (Dedicated to Florence Hofmann.) Bosnia.

4. **SPECULARIA**, Heist. About 10 or 12 annual herbs in the northern hemisphere, one grown in flower-gardens; the genus differs from *Campanula* primarily in the elongated cylindric or prismatic ovary with calyx-lobes prominent at its apex as well as in the prevailing rotate corolla; stigmas and cells of ovary 3.

**S. Speculum-Veneris**, Caruel (*S. Speculum*, A. DC.). **VENUS LOOKING-GLASS** (as the old Latin name *Speculum-Veneris* means, and from which the generic name is derived). Nearly or quite glabrous branching annual 9-15 in. high: lvs. alternate, oblong to spatulate, 1½ in. or less long, narrowed below or the upper ones sessile, mostly obtuse, crenulate: fls. 1-3 on peduncles in all the upper axils, bright violet-blue but varying to white and double, the rotate corolla about  $\frac{3}{4}$  in. across; calyx-lobes narrow and prominent, reaching or surpassing the corolla-sinuses; often bracts at base of long ovary much like corolla-lobes. Cent. Eu. and Medit. region.

5. **PLATYCODON**, A. DC. One showy perennial in E. Asia, common in cult.—Distinguished from *Campanula* by opening its caps. at the top by means of valves rather than on the sides or at base by means of lids or other separate openings; stamens much dilated at base, the anthers not united; stigmas 5 and caps. 5-celled. (*Platyco-don*: Greek *broad bell*, from the shape of the fls.).

**P. grandiflorum**, A. DC. (*Campanula grandiflora*, Jacq.). **BALLOON-FLOWER** (from the inflated buds). Sts. erect, branched above, glabrous, 1½-2½ ft.: lvs. ovate to ovate-lanceolate, 1-3 in. long, short-petioled, usually acute, sharp-dentate, glabrous, glaucous-blue beneath: fls. mostly solitary terminating long branches or peduncles, 2-3 in. across, dark rich blue to pale and white; calyx-lobes narrow,  $\frac{1}{4}$ - $\frac{5}{8}$  in. long; corolla open-bell-shaped or deep-saucer-shaped, with 5 or sometimes more broad acute lobes.—Var. **Mariesii**, Nichols., is a dwarf form 12-18 in. high, compact, the fls. large; sent from Japan to England by Maries. Var. **japonicum**, Dreer, is a strong bushy tall form with about 10 lobes to corolla, giving a stellate effect.

## 166. LOBELIACEÆ. LOBELIA FAMILY

Herbs or in trop. regions rarely shrubs or trees, often with acrid milky juice; about 20 genera and 600 species widely distributed, some grown for their bright showy fls.—Lvs. alternate or basal, simple, entire, toothed or pinnately parted: fls. solitary, spicate, racemose or paniculate; calyx-limb 5-lobed or -parted, the lobes equal or unequal; corolla gamopetalous, irregular, often bilabiate, its tube often open on one side nearly or quite to base, its limb 5-lobed; stamens 5, inserted with the corolla; filaments sometimes forming a tube; anthers united around the style; ovary inferior, 2-5-celled; stigma fringed: fr. a caps. or berry, with numerous seeds.—Often united with Campanulacæ; separated primarily by the ring or tube formed by the union of the anthers and by the very irregular corolla. *J*, Fig. 13, page 684.

- Corolla-tube split to base on one side.....1. LOBELIA  
 Corolla-tube shortly or not at all split.  
     Stamens free from the corolla or nearly so.....2. DOWNINGIA  
     Stamens united with the lower part of the corolla-tube.....3. CENTROPOGON

1. **LOBELIA**, L. Annual or perennial flower-garden and border plants; species 250 or more, in many parts of the world, well represented in E. U. S.— Mostly herbs, some trop. species somewhat woody: lvs. alternate, the cauline sometimes reduced to bracts: fls. blue, red, yellowish or white, in terminal racemes, spikes or panicles; calyx with short or globular tube and short teeth; corolla-tube split to the base on one side, the limb with 5 lobes, the 3 on the lower side forming a lip, the other 2 (1 on either side of the cleft) erect or turned back; anthers united into a tube or ring around the style, 2 or all hairy at tips; ovary 2-celled, many-ovuled: fr. a 2-valved caps. (*Lobelia*: Matthias de Lobel or L'Obel, 1538–1616, a Flemish botanist and author.)

- Plant annual (or so treated), low and diffuse.  
     Beard or hairy tufts on only the 2 (or 3) lower anthers.....1. *L. Erinus*  
     Beard or hairy tufts on all the anthers.  
         Lower lvs. deeply cut or parted.  
             Seeds angled, not winged.....2. *L. gracilis*  
             Seeds winged.....3. *L. heterophylla*  
         Lower lvs. mostly ternately divided.....4. *L. tenuior*  
 Plant perennial (rarely biennial), usually tall or strict-growing.  
     Corolla very unequally bilabiate, the lower lip 3-lobed.  
         Fls. in shades of red or yellow or very rarely white.  
             Bracts mostly very narrow, the upper little exceeding the pedicels: plants glabrous or nearly so.....5. *L. cardinalis*  
             Bracts more leafy: plant mostly pubescent.....6. *L. fulgens*  
         Fls. blue or violet (sometimes varying to white).  
             Spike wand-like; fls. about 1 in. long.....7. *L. syphilitica*  
             Spike heavy; fls. 1½ in. or more long.....8. *L. Gerardii*  
         Corolla more equally 2-lipped, the lower lip notched.....9. *L. laxiflora*

1. **L. Erinus**, L. Diffuse and half-trailing annual, 6–12 in. high, glabrous or slightly hairy below, the slender branching sts. leafy throughout: lower lvs. obovate or spatulate, crenate-toothed, very obtuse; upper lvs. oblanceolate or oblong (becoming linear and acute near the top of the st.), mostly sharp-angled: fls. ½–¾ in. across, on slender pedicels; calyx-segms. awl-like, spreading, as long as the corolla-tube; corolla light blue or violet with white or yellowish throat, the 3 lower lobes large and spreading; the 2 lower anthers bearded. (*Erinus*: ancient name of a plant of this habit, used also as a generic name in Scrophulariaceæ.) S. Afr.— One of the commonest annual edging plants. Exceedingly variable in habit, in color of foliage and color and size of fls. The dense low-growing forms are used for low close edgings, the forms with long slender sts., as var. *gracilis*, are suitable for vases or baskets. Other strains have yellowish or bronzy foliage. Still other kinds have fls. white, crimson, rose, blue or purplish, one being double-fl'd. Var. *speciosa* has large azure-blue fls. with a white eye.

2. **L. gracilis**, Andr. Slender, glabrous, decumbent at base, 1 ft. or less high: lower lvs. ovate, deeply cut, the upper narrower and pinnatifid, becoming linear and entire at the top of the st.: fl.-cluster long and open, more or less one-sided; fls. ½–¾ in. across, blue with a whitish eye, the middle lower corolla-lobe strongly obovate, the 2 upper lobes small and curved and usually hairy; anthers all bearded: seeds angled, not winged. New S. Wales.

3. **L. heterophylla**, Labill. Much like the last: lower lvs. parted into linear lobes: fls. larger, the middle corolla-lobe nearly 1 in. long: seeds winged. W. Australia.

4. **L. tenuior**, R. Br. Erect or ascending, with slender sparsely leafy branches, 12–18 in. high, pubescent: lower lvs. small, mostly ternately parted or divided; upper lvs. linear or lanceolate, mostly entire: fls. rather large, bright blue, borne far apart on long slender pedicels; middle corolla-lobe obovate, much larger than the others; anthers all bearded: seeds compressed, smooth and shining. W. Australia.

5. **L. cardinalis**, L. CARDINAL-FLOWER. INDIAN-PINK. Straight-growing perennial 2–4 ft. high, usually unbranched: lvs. short-petiolate or sessile, oblong-ovate to oblong-lanceolate, acute or acuminate, irregularly serrate or serrulate: fls. intensely bright cardinal (rarely varying to white), in a long narrow-bracted racemose spike; calyx-tube hemispherical, much shorter than the subulate-linear lobes;



corolla-tube 1 in. long, the 3 lower lobes very narrow; larger anthers naked at tip; seeds rugose-tuberculate. N. B. to Sask., Fla. and Tex.

6. *L. fulgens*, Willd. (*L. formosa*, Hort. *L. cardinalis*, Hort., in part). Perennial 2-3 ft. high, grown under glass and planted out, downy or glabrous, variously tinged with brown or bronze, the st. sending out short offsets at base: lvs. sessile, lanceolate, pointed, somewhat toothed, the lower 3-4 in. long: bracts of infl. leafy, often three to four times as long as the pedicels: fls. large, deep red, showy; calyx-segms. linear, pointed, about as long as corolla-tube; corolla much as in the preceding. Mex.

7. *L. syphilitica*, L. Strong weedy perennial herb 2-3 ft. high, glabrous or with scattered hairs, the st. mostly simple, leafy throughout: lvs. thin, oblong-oval to lanceolate, tapering to both ends, wing-petioled or sessile, bluntish at apex, crenate-denticulate or irregularly toothed, the longest 5-6 in. long: fls. deep blue or purplish (a var. has nearly white fls.), in a long wand-like narrow-bracted racemose spike; calyx hairy, enlarging in fr., the lance-acuminate lobes conspicuous, the sinuses with an auriculate appendage; corolla about 1 in. long, the tube half as long, the lower lip 3-lobed and deflexed, the upper lip very small; larger anthers naked at tip. Me. to La. west to Kans. and Dak.

8. *L. Gerardii*, Hort. Habit of *L. cardinalis*: lvs. lanceolate or lance-oblong, denticulate, glabrous: fls. rich violet, varying to rose, coral-red or purple,  $1\frac{1}{2}$  in. or more long, in a heavy terminal spike or raceme; calyx hispid suggesting that of *L. syphilitica*. Hybrid between *L. syphilitica* and the "Queen Victoria" form of *L. fulgens*, obtained at the Botanic Gardens of Lyons. (Named for M. Gerard, director of the botanical collection at Lyons.)

9. *L. laxiflora*, HBK. Branching herb or subshrub 2-5 ft. high, grown mostly under glass, with thinly hairy sts.: lvs. nearly sessile, lanceolate or ovate-lanceolate, acuminate, sharp-denticulate: fls. red and yellow, pubescent, cylindric,  $1\frac{1}{2}$  in. long, on long axillary pedicels, the stamens projecting from one side. Mex.—Var. *angustifolia*, DC. (*L. Cavanillei*, Hort.). Lvs. long and narrow, sometimes even linear: corolla 1- $1\frac{1}{4}$  in. long, scarlet with yellow lip. Mex.

2. **DOWNINGIA**, Torr. Low annuals with showy fls., interesting as pot-plants or for edgings; species 6-8, mostly in Ore. and Calif., 1 in Chile.—Lvs. alternate, entire, passing above into bracts: fls. blue, violet, yellow or white, sessile in the axils of the lvs. or bracts; corolla-tube short, not split, the bilabiate limb with the upper lobes much narrower than the 3 lower ones; stamens free from corolla; ovary 2-celled or by the disappearance of the thin division wall 1-celled: caps. linear, dehiscent lengthwise by 1-3 valves or fissures, bearing at its apex the leafy linear calyx-lobes; seeds smooth, small, numerous. (Downingia: after Andrew Jackson Downing, 1815-1852, American horticulturist.)

Lower corolla-lip concave; stamen-column much exserted, the anther-tube nearly hook-shaped.....1. *D. elegans*  
Lower corolla-lip plane; stamen-column little or not at all exserted, the anther-tube straight or only slightly curved.....2. *D. pulchella*

1. *D. elegans*, Torr. (*Clintonia elegans*, Dougl.). St. usually simple, 4-7 in. high: lvs. oblong to oblong-lanceolate: corolla light blue with darker veinlets, the palate of the lower lip white with 2 green or yellowish spots and yellow lines; upper lip cut two-thirds of the way down, the lower with 3 parallel lobes at apex; stamen-column long-exserted, the down-curved anther-column almost hook-shaped and with 2 bristles on the lower side. Calif. to Wash.

2. *D. pulchella*, Torr. (*Clintonia pulchella*, Lindl.). Erect or ascending, 2-10 in. high: lvs. oblong-ovate or narrower,  $\frac{1}{2}$  in. long: calyx-limb rotate, the 5 lobes blunt; corolla deep blue; center of lower lip white with 2 yellow and 3 purple spots; corolla-tube short, the upper lip deeply 2-cleft into oblanceolate lobes, the lower lip wide-spreading, deeply cleft into 3 broad lobes; stamen-column little or not at all exserted, the anther-tube nearly straight, with 2 short bristles at apex. Calif. and Ore.

3. **CENTROPOGON**, Presl. Warmhouse perennials, some used for hanging-baskets; more than 100 species in trop. Amer.—Subshrubs or shrubs, often scandent: lvs. alternate, mostly dentate or serrate: fls. red, orange or sometimes greenish, solitary and axillary on long peduncles or sometimes in terminal clusters; calyx-segms. tooth-like or leafy; corolla-tube shortly or not at all

split; stamens united with the lower part of the corolla-tube: fr. a berry. (Centropogon: Greek *spur* and *beard*, referring to the fringed stigma.)

**C. Lucyanus**, Houll. Somewhat woody, 1-2 ft. high: lvs. oblong- or ovate-lanceolate, petioled, finely toothed, acuminate: fls. rose-carmine, tubular, freely produced at the ends of the branches; calyx-segms. lanceolate-acuminate; corolla  $1\frac{1}{2}$  in. long, somewhat pubescent, with long nearly straight tube and short limb; stamen-column exserted, the anther-column white-bristly at apex. (Named for M. Lucy, president of the horticultural society of Marseilles.)

## 167. COMPOSITÆ. COMPOSITE FAMILY

A vast family represented in all parts of the world, deriving its name from the many blossoms (or florets) combined into an involucrate head, as if they were inclosed in a single calyx and constituted a compound or composite fl.; mostly annual and perennial herbs, but a few are woody although scarcely true trees; many genera are prized among ornamentals, mostly in the open garden, and several others yield kitchen-garden vegetables; the genera are upwards of 800, and the known species are probably 12,000.—Plants erect or twining or drooping, sometimes with milky juice, often with strong aromatic qualities: lvs. very various, alternate, opposite or whorled, without stipules: fls. bisexual or unisexual, aggregated into small or large compact heads (known to gardeners as “flowers”); corolla gamopetalous, 4-5-lobed or -toothed, either all regular or all ligulate (produced into a long limb on one side) or the interior ones regular and the marginal ones ligulate and constituting rays to the head; in some cases the corolla is 2-lipped; stamens 4 or 5, alternating with the corolla-lobes, joined by their anthers to form a ring around the style (syngenesious), the 2 long stigmas projecting; ovary 1, inferior, 1-celled: fr. an achene (“seed” of gardeners), usually crowned by a pappus (representing the calyx-limb) comprised of scales, barbs, hairs or plumes: the fls. are borne on a variously modified and enlarged receptacle, each one subtended by a scale or bract or in many cases the receptacle naked. The illustrations in Fig. 14 show various representative structures in the Compositæ, although not all of them are represented in the treatment herein. Various kinds of heads are shown: with rays in *B, E, J, L, M, N, P*; without rays, *C, F, G, H, I, K*; involucre of different structure, of several to many scales except in *O* in which the pistillate head has a bur-like involucre; pappus at *C, E, G, H, I, K, L, M, P*.—The Compositæ represent a generalized group, only few of the species being highly specialized. For the most part they have not been greatly modified and confused by cult., the marked exceptions being *Chrysanthemum*, *Dahlia* and *Lactuca*. They constitute a “natural” family.

Species belonging to the genera *Anaphalis*, *Chrysogonum*, *Lepachys*, *Liatris*, *Parthenium*, *Silphium*, *Solidago*, *Tussilago* and others, whose mention in the trade is only occasional, are not here included; they may be found in the manuals describing the native and naturalized flora. As the composites are showy, numbers of the native kinds may be transferred to grounds now and then, but this does not make them cult. plants in the understanding of this book. The genus *Olearia*, Moench (*Shawia*, Forst.), is represented to some extent on the Pacific Coast by *O. Haastii*, Hook. f., from New Zealand: it is a branching shrub to 8 feet, with white-tomentose shoots and small ovate to elliptic-oblong lvs. white-tomentose beneath: heads many, small, in corymbs, the white ray florets 3-5. *Olearia* is of the Aster tribe. The genus *Celmisia*, Cass., endemic in New Zeal., may be expected to yield cult. subjects for the Pacific region; the species are perennial herbs with tomentose radical rosulate long lvs., and solitary white-rayed heads on bracteate scapes.



FIG. 14. DIPSACEÆ AND COMPOSITÆ.

A, Head of *Dipsacus*. B, *Chrysanthemum maximum*, with ray floret at left, disk floret at right, involucre beneath. C, Head of *Chrysanthemum Balsamita*. D, Diagram of compositous florets. E, *Helenium*. F, *Artemisia Absinthium*, showing separate head and hairy receptacle. G, *Ambrosia trifida*, with detached heads and achene. H, *Eupatorium perfoliatum*. I, Details in *Eupatorium*. J, *Achillea Millefolium*. K, *Cirsium arvense*. L, *Bidens*. M, *Inula Helenium*, plant and details. N, *Tussilago Farfara*, showing leaf and four scapes. O, *Xanthium*, showing the bur involucre. P, *Cichorium Intybus*.

# COMPOSITÆ

## 1. KEY TO THE TRIBES (Leads to Key 2).

- A. Juice milky; disk-corollas ligulate..... 1. CICHORIUM TRIBE
- AA. Juice not milky; disk-corollas not ligulate (except in "double" hort. forms).
- B. Heads with true rays.
- c. Fls. of disk all or some of them bilabiate: lvs. pinnately lobed or parted..... 2. MUTISIA TRIBE
- CC. Fls. of disk not bilabiate (except sometimes in Ligularia).
- D. Involucral bracts wholly or partly dry and scarious, imbricated: lvs. in ours commonly lobed or dissected; strongly scented or bitter-aromatic plants..... 3. ANTHEMIS TRIBE
- DD. Involucral bracts in ours not as above, or if so the plants not strongly scented.
- E. Receptacle with chaffy bracts or bristles subtending at least the outer disk-fls.; anthers not tailed at base (produced into long points below pollen-sacs).
- F. Pappus never of capillary bristles (sometimes of rigid bristles): lvs. all or some of them opposite..... 4. HELIANTHUS TRIBE
- FF. Pappus wholly or only the inner series of slender bristles: lvs. commonly alternate.
- g. Disk commonly yellow; rays seldom yellow, not with a dark spot at base..... 5. ASTER TRIBE
- gg. Disk not yellow or if so the rays yellow with a dark spot at base..... 6. ARCTOTIS TRIBE
- EE. Receptacle naked.
- F. Herbage in ours punctate or glandular- or resinous-dotted: anthers not tailed at base..... 7. HELENIUM TRIBE
- FF. Herbage not as above.
- g. Bracts of involucre in 1-3 series, equal or nearly so and not imbricated.
- H. Pappus in ours none; rays yellow or whitish; anthers tailed at base..... 8. CALENDULA TRIBE
- HH. Pappus of numerous soft capillary bristles; anthers not tailed at base.
- I. Rays commonly yellow..... 9. SENECIO TRIBE
- II. Rays seldom yellow..... 5. ASTER TRIBE
- GG. Bracts of involucre commonly in several to many series, unequal and imbricated.
- H. Rays seldom yellow, not dark-colored at base; disk-fls. commonly yellow (sometimes turning purple); anthers not tailed at base..... 5. ASTER TRIBE
- HH. Rays commonly yellow.
- I. Disk-fls. not yellow or if so the rays with a dark spot at base; anthers not tailed at base..... 6. ARCTOTIS TRIBE
- II. Disk-fls. commonly yellow, the rays without a dark spot at base; anthers tailed at base..... 10. INULA TRIBE
- BB. Heads without true rays (marginal disk-corollas or inner involucral bracts sometimes enlarged and ray-like).
- C. Marginal disk-corollas not enlarged nor resembling true rays.
- D. Lvs. opposite, never spinose: fls. regular, all alike; anthers not tailed at base.
- E. Plants with heads clustered; disk never yellow nor elongated..... 11. EUPATORIUM TRIBE
- EE. Plants with heads solitary; disk greenish-yellow, elongated and ovoid or conic..... 4. HELIANTHUS TRIBE (*Spilanthes*)
- DD. Lvs. alternate or basal.
- E. Inner involucral bracts enlarged and petal-like, white or colored; anthers tailed at base.
- F. Pappus of long-acuminate scales; receptacle chaffy... 12. CYNARA TRIBE (*Xeranthemum*)
- FF. Pappus consisting of bristles or of short scales; receptacle naked or sometimes chaffy..... 10. INULA TRIBE
- EE. Inner involucral bracts not enlarged nor petal-like.
- F. Tips and margins of lvs. or of involucral bracts not spinose.
- g. Plants with lobed or dissected lvs.
- H. Receptacle bristly; involucre ovoid or globose... 12. CYNARA TRIBE
- HH. Receptacle never bristly; involucre neither ovoid nor globose.
- I. Involucral bracts imbricated, wholly or partly dry and scarious..... 3. ANTHEMIS TRIBE
- II. Involucral bracts not as above..... 9. SENECIO TRIBE
- GG. Plants with lvs. not lobed nor dissected.
- H. Fl.-heads in dense clusters surrounded by a whorl of woolly floral lvs.; anthers tailed at base... 10. INULA TRIBE (*Leontopodium*)
- HH. Fl.-heads not as above; anthers not tailed at base.
- I. Lf. linear, not fleshy; disk-fls. yellow..... 5. ASTER TRIBE
- II. Lf. broader or fleshy.



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- J. Involucral bracts imbricated: fls. never yellow . . . . . 11. EUPATORIUM TRIBE
- JJ. Involucral bracts not imbricated: fls. sometimes yellow . . . . . 9. SENECIO TRIBE
- FF. Tips and margins of lvs. or of involucral bracts spinose . . . . . 12. CYNARA TRIBE
- CC. Marginal disk-corollas enlarged, resembling ray-fls.; involucral bracts in many series; tips and margins of lvs. and of involucral bracts often spinose . . . . . 13. VERNONIA TRIBE
- D. Receptacle naked; fls. never yellow; anthers not tailed . . . . . 12. CYNARA TRIBE
- DD. Receptacle bristly or chaffy; fls. sometimes yellow; anthers tailed at base . . . . . 12. CYNARA TRIBE

## 2. KEY TO THE GENERA (Sequence from Key 1).

- 1. CICHORIUM TRIBE. Herbs (seldom shrubs or trees) with milky juice; fls. all bisexual, with ligulate corolla 5-toothed; anthers sagittate-eared, not tailed at base; style-branches filiform, not appendaged.
  - A. Pappus paleaceous or partly so, or aristiform, or plumose.
    - B. Achenes with summit truncate or only slightly contracted below apex.
      - C. Fls. purple, blue or white (in ours).
        - DD. Heads mostly sessile; involucral bracts in 2 series . . . . . 1. CICHORIUM
        - DD. Heads terminating long peduncles; bracts in many series . . . . . 2. CATANANCHE
      - CC. Fls. yellow.
        - D. Plant thistle-like: heads sessile . . . . . 3. SCOLYMUS
        - DD. Plant not thistle-like: heads long-pedunculate . . . . . 4. SCORZONERA
    - BB. Achenes long-beaked: heads pedunculate . . . . . 5. TRAGOPOGON
  - AA. Pappus of capillary bristles that are scabrous, rarely barbellulate, never plumose nor paleaceous-dilated; receptacle naked.
    - B. Achenes beaked.
      - C. Plants with lvs. all basal: heads solitary . . . . . 6. TARAXACUM
      - CC. Plants with leafy sts.: heads clustered . . . . . 7. LACTUCA
    - BB. Achenes not beaked: sts. commonly leafy.
      - C. Lvs. in ours long-hairy: pappus-bristles rather rigid, usually dirty or neutral-colored . . . . . 8. HIERACIUM
      - CC. Lvs. in ours nearly glabrous: pappus-bristles usually soft, white . . . . . 9. CREPIS
- 2. MUTISIA TRIBE. Heads with or without rays; involucral bracts usually in many series, imbricated; fls. commonly with corollas bilabiate or deeply 5-cleft or the ray-fls. ligulate; anthers with long tails at base; style-branches not appendaged . . . . . 10. GERBERA
- 3. ANTHEMIS TRIBE. Commonly strong-scented or bitter-aromatic; lvs. mostly alternate and more or less dissected; heads radiate or discoid; involucral bracts imbricated in 2-many series, wholly or in part dry and scarious; disk-corollas regular, tubular; anthers not tailed at base; style-branches of the bisexual fls. commonly truncate.
  - A. Rays usually present.
    - B. Heads mostly small and in dense clusters; receptacle chaffy . . . . . 11. ACHILLEA
    - BB. Heads medium-sized to very large, solitary or loosely clustered.
      - C. Receptacle naked.
        - D. Involucral bracts in many series . . . . . 12. CHRYSANTHEMUM
        - DD. Involucral bracts in few series . . . . . 13. MATRICARIA
      - CC. Receptacle with chaffy bracts . . . . . 14. ANTHEMIS
  - AA. Rays lacking or inconspicuous.
    - B. Involucral bracts in many series . . . . . 15. TANACETUM
    - BB. Involucral bracts in 1-2 or few series.
      - C. Heads mostly small and inconspicuous, clustered . . . . . 16. ARTEMISIA
      - CC. Heads of medium size, solitary and long-pedunculate . . . . . 17. SANTOLINA
- 4. HELIANTHUS TRIBE. Lvs. commonly opposite (at least the lower ones); heads mostly radiate; involucral bracts usually herbaceous, in 1 to many series; receptacle (in ours) with chaffy bracts subtending at least the outer disk-fls.; anthers not tailed at base; style-branches truncate or appendaged; pappus never of capillary bristles.
  - A. Plants (ours) with all or some of the lvs. alternate.
    - B. Rays rose-purple or rose color; bracts of receptacle rigid, exceeding the disk-fls. . . . . 18. ECHINACEA
    - BB. Rays yellow or white; bracts of receptacle not as above.
      - C. Bracts of involucre enfolding the ray-achenes: ours glandular-viscid annuals.
        - D. Achenes of ray-fls. laterally compressed (flattened from side to side) . . . . . 19. MADIA
        - DD. Achenes of ray-fls. obcompressed (flattened from front to back) . . . . . 20. LAYIA

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- cc. Bracts of involucre not enfolding the ray-achenes: mostly perennials not glandular or viscid.
  - d. Lvs. 1-3-parted or divided into linear or filiform segms.: plants smooth and glabrous.....21. LEPTOSYNE
- dd. Lvs. simple or if compound the segms. broader: plants coarse, glabrous or hairy.
  - e. Disk hemispheric or globose to columnar: lvs. simple or compound.....22. RUDBECKIA
  - ee. Disk flat or convex: lvs. simple.....23. HELIANTHUS
- AA. Plants (ours) with opposite lvs.
  - B. Heads in ours without rays; disk ovoid or conical.....24. SPILANTHES
- BB. Heads in ours with rays.
  - c. Ray-fls. persisting on the achene and falling with it.
    - d. Lvs. mostly sessile and entire: ours erect annuals.....25. ZINNIA
    - dd. Lvs. more or less petioled.
      - e. Diam. of heads about  $\frac{3}{4}$  in.: sts. trailing: ours annual.....26. SANVITALIA
      - ee. Diam. of heads  $1\frac{1}{2}$ - $2\frac{1}{2}$  in.: sts. erect: ours perennial.....27. HELIOPSIS
  - CC. Ray-fls. withering and falling before the achene.
    - d. Pappus represented by 2-4 retrorsely barbed awns.
      - e. Achenes not beaked: rays yellow, white or none.....28. BIDENS
      - ee. Achenes beaked: rays commonly not yellow.....29. COSMOS
    - DD. Pappus not as above.
      - e. Roots tuberous: rays commonly white or in shades of red or purple.....30. DAHLIA
      - ee. Roots not tuberous: rays commonly yellow or brown and yellow.
        - f. Bracts of involucre in 2 series.
          - g. Inner involucre bracts connate to or above the middle.....31. THELESPERMA
          - gg. Inner involucre bracts connate at base.....32. COREOPSIS
        - FF. Bracts of involucre commonly in more than 2 series.....23. HELIANTHUS

5. ASTER TRIBE. Lvs. alternate or rarely opposite: heads radiate or discoid; involucre bracts usually unequal and in many series; receptacle seldom chaffy; disk-fls. chiefly yellow; anthers not tailed at base; style-branches of the bisexual fls. flattened, appendaged; pappus various, or none.

- A. Fl.-heads discoid (seldom radiate), the fls. yellow.....33. LINOSYRIS
- AA. Fl.-heads with rays, these never yellow (except in *Erigeron aurantiacus*).
  - B. Heads 2-5 in. across ( $1-1\frac{1}{2}$  in. in the pompon vars.); outer involucre bracts commonly leafy, longer than the others and reflexed.....34. CALLISTEPHUS
- BB. Heads smaller; outer involucre bracts not leafy nor reflexed.
  - c. Plants (ours) with lvs. all basal.....35. BELLIS
- CC. Plants with leafy sts.
  - d. St.-lvs. opposite.....36. FELICIA
- DD. St.-lvs. (at least the upper) alternate.
  - E. Bracts of the involucre in few series, commonly nearly equal.
    - f. Lvs. pinnately divided into narrow segms.....37. BRACHYCOME
  - FF. Lvs. (at least the upper) entire or only toothed.
    - g. Herbage (in ours) glabrous throughout.....38. BOLTONIA
  - GG. Herbage (in ours) more or less hairy.
    - h. Species annual: lvs. entire: involucre bracts in 1 series.....39. CHARIEIS
  - HH. Species perennial.
    - i. Peduncles with numerous small leafy bracts; involucre bracts often reddish-tipped.
      - j. Involucre bracts obtuse, scarious-margined.....40. CALIMERIS
    - JJ. Involucre bracts subulate, not scarious-margined.....41. ASTER
  - II. Peduncles (in ours) naked or nearly so: involucre bracts not red-margined.
    - j. Diam. of heads  $\frac{1}{4}$ - $\frac{1}{2}$  in.: some of the st.-lvs. fascicled.....42. VITTADINIA
    - JJ. Diam. of heads mostly greater: st.-lvs. not fascicled.....43. ERIGERON
- EE. Bracts of the involucre commonly in many series, unequal and well-imbricated.....41. ASTER

6. ARCTOTIS TRIBE. Lvs. mostly alternate or basal: heads commonly radiate; involucre bracts imbricated in several rows, separate or united at base; fls. of the disk tubular and regular; anthers not tailed at base; style-branches not appendaged.

- A. Herbage tomentose: receptacle naked or bristly.
- B. Involucre bracts separate from each other.

# COMPOSITÆ

- c. Achenes usually villous, crowned by hyaline, often convolute scales: heads white or violet and white.....44. *ARCTOTIS*  
 cc. Achenes glabrous, with or without crown of minute scales: heads golden-yellow.....45. *VENIDIUM*  
 BB. Involucral bracts grown together at base.....46. *GAZANIA*  
 AA. Herbage glabrous or pubescent: involucral bracts not grown together; receptacle chaffy.....47. *URSINIA*
7. *HELENIUM* TRIBE. Lvs. not rarely glandular-punctate or glandular- or resinous-dotted: heads radiate or rarely discoid; involucral bracts in 1-several series; receptacle naked; fls. commonly yellow; anthers not tailed at base; style-branches truncate or appendaged.
- A. Involucral bracts united nearly throughout: herbage glabrous.....48. *TAGETES*  
 AA. Involucral bracts separate or united only at base: herbage seldom glabrous.  
 B. Lvs. mostly opposite, pinnately parted into narrow segms.....49. *ACTINOLEPIS*  
 BB. Lvs. alternate (some of the lowermost opposite), mostly entire or toothed.  
 c. Rays rose-red; receptacle flat.....50. *POLYPTERIS*  
 cc. Rays yellow or brownish-red; receptacle convex to oblong.  
 d. Base of lf. decurrent on the st. except in *H. Hoopesii*.....51. *HELENIUM*  
 dd. Base of lf. not decurrent on st.....52. *GAILLARDIA*
8. *CALENDULA* TRIBE. Herbs or shrubs: lvs. commonly alternate: heads radiate; involucral bracts subequal, in 1-3 series, often with dry-scarious border; receptacle naked, or very seldom with a few bristles; disk-fls. regular, tubular, 5-toothed, mostly infertile; ray-fls. pistillate and fertile, commonly ligulate; anthers with base sagittate or sometimes eared or tailed; style-branches bifid or entire: achenes usually large; pappus commonly none, sometimes of a few deciduous hairs.  
 A. Ray-achenes straight: lvs. mostly conspicuously toothed.....53. *DIMORPHOTHECA*  
 AA. Ray-achenes incurved: lvs. (in ours) entire or minutely toothed.....54. *CALENDULA*
9. *SENECIO* TRIBE. Lvs. mostly alternate or basal: heads commonly radiate; involucral bracts mostly equal and in 1 or 2 series, with or without short accessory bracts at base; receptacle naked; anthers not tailed at base; style-branches truncate or obtuse, with or without appendages.
- A. Bracts of involucre in 1 series, connate at base or beyond middle into a cup.  
 B. Lvs. thin, mostly pinnatisect: st. erect or ascending.....55. *GAMOLEPIS*  
 BB. Lvs. fleshy, simple: st. drooping or trailing.....56. *OTHONNA*  
 AA. Bracts of involucre in 1-3 series, not connate in a cup but separate, at least finally.  
 B. Involucre without small short bracts at base: st.-lvs. mostly clasping or broadly wing-petioled.  
 c. Heads radiate; involucral bracts in 2-3 series.....57. *DORONICUM*  
 cc. Heads rayless; involucral bracts in 1 series.....58. *EMILIA*  
 BB. Involucre commonly with small short bracts at base (these sometimes lacking in *Senecio*): petiole usually present, winged or wingless.  
 c. Margins of involucral bracts overlapping: heads radiate.....59. *LIGULARIA*  
 cc. Margins of involucral bracts not overlapping.  
 d. Sts. densely clothed with violet or purple hairs: lvs. simple: heads rayless.....60. *GYNURA*  
 dd. Sts. without violet or purple hairs: heads with or without rays.  
 E. Lvs. basal, simple, appearing during or after anthesis....61. *PETASITES*  
 EE. Lvs. seldom all basal, often lobed or parted, appearing before the fls.....62. *SENECIO*
10. *INULA* TRIBE. Often woolly: lvs. commonly alternate or basal, entire or nearly so: heads radiate or discoid; involucral bracts commonly dry and scarious and in several series, sometimes foliaceous or petaloid; receptacle naked or scaly; anthers tailed at base.
- A. Heads surrounded by a whorl of white-woolly floral lvs.; bisexual fls. sterile.....63. *LEONTOPODIUM*  
 AA. Heads not surrounded by a whorl of floral lvs.; bisexual fls. fertile.  
 B. Fl.-heads with disk-fls. only; involucral bracts commonly white or colored and petal-like.  
 c. St. and branches (in ours) conspicuously winged: pappus crown- or cup-shaped.....64. *AMMOBIUM*  
 cc. St. and branches not winged: pappus bristly.  
 d. Pappus-bristles plumose at base.....65. *HELIPTERUM*  
 dd. Pappus-bristles not plumose at base.....66. *HELICHRYSUM*  
 BB. Fl.-heads with both ray- and disk-fls., the rays yellow; involucral bracts not as above.

- c. Involucral bracts thin and scarious except at extreme base; stigmatic lines not confluent at apex. .... 67. *PODOLEPIS*  
 cc. Involucral bracts (at least the outer) with upper portion commonly herbaceous; stigmatic lines fusing at tips. .... 68. *INULA*
11. **EUPATORIUM TRIBE.** Lvs. simple; heads discoid; involucral bracts imbricate in several series or in 1-2 series and only slightly unequal; corollas tubular, regular, never pure yellow; anthers not tailed at base; style-branches commonly elongate, more or less thickened above; pappus commonly setose.
- A. Anthers truncate at apex, not appendaged. .... 69. *PIQUERIA*  
 AA. Anthers appendaged at apex.  
 B. Pappus wholly of capillary bristles. .... 70. *EUPATORIUM*  
 BB. Pappus of awned or blunt chaffy scales or crown-shaped. .... 71. *AGERATUM*
12. **CYNARA TRIBE.** Lvs. alternate, often spinose-toothed or -lobed; involucral bracts imbricated in many series, often spinose or scarious or foliaceous at tip; fls. bisexual, the corollas tubular with 5 long narrow lobes, or the marginal enlarged ray-like and usually neutral; anthers tailed at base; style-branches short, distinct or united.
- A. Heads 1-fld., aggregated into larger involucrate heads. .... 72. *ECHINOPS*  
 AA. Heads several-many-fld.  
 B. Plants not thistle-like or spiny.  
 C. Involucral bracts with hooked tips: lvs. roundish and mostly cordate. .... 73. *ARCTIUM*  
 cc. Involucral bracts not with hooked tips: lvs. elongate, not cordate.  
 D. Inner bracts of involucre petal-like. .... 74. *XERANTHEMUM*  
 DD. Inner bracts of involucre not petal-like. .... 75. *CENTAUREA*  
 BB. Plants thistle-like, often spiny.  
 C. Fl.-heads surrounded by a tuft of leafy bracts; fls. orange or yellow.  
 D. Lvs. minutely spinose-toothed: fls. orange-color. .... 76. *CARTHAMUS*  
 DD. Lvs. conspicuously toothed or cut: fls. yellow. .... 77. *CNICUS*  
 cc. Fl.-heads not surrounded by a tuft of leafy bracts: fls. purple, pinkish or white.  
 D. Sts. winged by the decurrent lf.-bases.  
 E. Herbage tomentose. .... 78. *ONOPORDUM*  
 EE. Herbage glabrous (in ours). .... 79. *CARDUS*  
 DD. Sts. seldom winged by the decurrent lf.-bases.  
 E. Lvs. glabrous, white-spotted above. .... 80. *SILYBUM*  
 EE. Lvs. tomentose beneath, not white-spotted above.  
 F. Receptacle fleshy. .... 81. *CYNARA*  
 FF. Receptacle not fleshy. .... 82. *CHAMÆPEUCE*
13. **VERNONIA TRIBE.** Lvs. commonly alternate and simple; heads discoid; fls. never yellow; involucral bracts imbricated in several series or rarely few in 1-2 series; corollas tubular and regular except in *Stokesia* which has its outer corollas enlarged and with palmately cleft limb simulating a ligule; anthers not tailed at base; style-branches slender, filiform or attenuate. .... 83. *STOKESIA*

1. **CICHORIUM**, L. Species 7 or 8, mostly in the Medit. region and to Abyssinia, two of them yielding food products.—Perennial, biennial or annual herbs, branching and diffuse when in bloom, mostly with deep hard roots: lvs. alternate, usually towards base of plant: heads mostly axillary and sessile, some terminal; involucral bracts in 2 series, at least the apical one-half herbaceous; fls. blue, purple or white, several to many in a head: achene long-beaked, crowned by a pappus of paleæ or scales. (*Cichorium*: from an old Arabic name.)

Bracts subtending heads commonly shorter than heads: fls. pale blue, white or pink.

Bracts subtending heads leafy, commonly longer than heads: fls. purple. .... 1. *C. Intybus*

..... 2. *C. Endivia*

1. **C. Intybus**, L. **CHICORY.** **SUCCORY.** Stout deep-rooted perennial, 3-6 ft.; upper branches practically leafless: lvs. broadly oblong, oblanceolate or lanceolate, more or less clasping, the lower ones nearly entire to runcinate, the upper passing into bracts commonly shorter than the heads: fls. bright azure-blue, in heads 1½ in. or more across, closing about noon: pappus about one-eighth to one-tenth as long as fr. (*Intybus*: Latin for chicory.) Eu.—Fls. in some races pink or white. Cult. for the root (substitute for coffee) and for the salad-lvs. (*Witloof*, *Barbe*.)



2. **C. Endivia**, L. **ENDIVE**. Annual or biennial, the branching leafy st. 2-3 ft.: lvs. many at base, brittle, oblong, lobed or cut, the upper passing into leafy bracts commonly much exceeding the heads: fls. purple: pappus about one-sixth to one-eighth as long as fr. (*Endivia*: probably derived from same root as *Intybus*.) Probably India.—Cult. as a salad plant.

2. **CATANANCHE**, L. About 5 species native to the Medit. region, one cult. for the showy bloom.—Annual or perennial herbs: lvs. linear or lanceolate, crowded toward the base of the st.: fls. blue or yellow, in long-peduncled heads; involucre bracts in many series, the apical two-thirds scarious; receptacle bristly: achene oblong, usually villose or setose, crowned with bristles or lanceolate long-acuminate scales. (*Catananche*: Greek name, referring to ancient custom of using the plant in making love-philters.)

**C. cærulea**, L. Perennial to 2 ft. high: lvs. tomentose, lanceolate or oblanceolate, entire or few-toothed: fl.-heads 2 in. across, on long slender peduncles, the wide flat-toothed rays blue or in vars. white or white-margined. S. Eu.

3. **SCOLYMUS**, L. Erect thistle-like herbs, native of the Medit. region, one somewhat cult. for its edible tap-root; 3 or 4 species.—Plant glabrous: lvs. alternate, pinnately spinose-toothed or -lobed, with bases decurrent in spinose wings: fls. yellow, in sessile heads; involucre bracts spinescent-tipped, in few rows; receptacle chaffy: achenes beakless. (*Scolymus*: old Greek name, used by Hesiod.)

**S. hispanicus**, L. **GOLDEN THISTLE**. **SPANISH OYSTER-PLANT**. Much-branched biennial 2-2½ ft. high: basal lvs. spiny, oblong, pinnatifid, dark green with paler ribs and veins: heads few-fl.: fr. chaff-like, wing-margined; pappus consisting of scarious unequal paleæ. S. Eu.

4. **SCORZONERA**, L. About 100 species of the Old World, one yielding a root-vegetable.—Perennial herbs or rarely annual: lvs. commonly entire and grass-like or wider, sometimes more or less pinnately lobed or dissected: fls. (in ours) yellow, in long-peduncled heads: achenes many-ribbed, beakless; pappus-bristles plumose with soft hairs, often naked at tip. (*Scorzone-ra*: old French *scorzon*, serpent; *S. hispanica* was used against snake-bite.)

**S. hispanica**, L. **BLACK SALSIFY**. Much-branched perennial herb, woolly-pubescent to nearly glabrous, 2-3 ft., with a long fleshy tap-root like that of salsify, but having a black skin: lvs. oblong to lanceolate or in some forms linear, undulate, tapering below into a long winged petiole: fls. yellow, in large long-peduncled heads; involucre bracts in several series, the outer much shorter than the inner: achenes nearly white, many-ribbed, the ribs of the outer ones papillate. Cent. and S. Eu.—Cult. for its fleshy edible root and for its lvs. which are sometimes used for salads.

5. **TRAGOPOGON**, L. **GOATS-BEARD**. About 35 described species native to S. Eu., N. Afr. and Cent. and S. Asia, one of them cult. in the vegetable-garden.—Erect glabrous biennial or perennial herbs with a tap-root and narrow grass-like lvs.: fls. purple or yellow, in large heads; involucre cylindric or nearly so, with approximately equal-length bracts in a single row; anthers sagittate; style-branches slender: pappus composed of plumose bristles in a single series. (*Tragopo-gon*: Greek for *goat's beard*.)

**T. porrifolius**, L. **SALSIFY**. **VEGETABLE-OYSTER**. **OYSTER-PLANT**. Strict biennial to 4 ft. high: lvs. keeled, tapering from a broad often clasping base: peduncle thickened and hollow beneath head: fls. purple, showy, opening in the morning and closing by noon, the outer rays exceeded by the involucre bracts; receptacle naked: achenes ("seeds") stick-like, long-beaked; pappus yellowish. S. Eu.—Cult. for its edible tap-root.

6. **TARAXACUM**, Haller. **DANDELION**. Species 6 or, according to some authorities, 20-25, mostly of the northern hemisphere, one sometimes grown

as a pot-herb.—Perennial herbs with runcinate-pinnatifid or lyrate lvs. in a rosulate basal cluster: fls. yellow, in heads terminating naked hollow scapes; involucre with outer bracts calyx-like, spreading or reflexed, those of the inner series narrow and erect; receptacle naked: pappus simple and capillary, borne on a slender beak terminating a fusiform elongated angled achene. (Taraxacum: name probably associated with supposed medicinal properties.)

**T. officinale**, Weber (*Leontodon Taraxacum*, L.). COMMON DANDELION. Widely spread as a naturalized weed, the showy fls. opening in sunshine: achene angled and ribbed, the ribs spinulose toward apex. Eu.—Several lf.-forms cult. for greens.

**7. LACTUCA**, L. Tall annual and perennial herbs of the northern hemisphere, about 100 species, many of them weedy, one widely cult. as a garden vegetable.—Lvs. alternate, variable, often pinnatifid: heads small, in long irregular panicles, the rays white, yellow, pink or blue; involucre cylindric, with several series of imbricated bracts of which the outermost are short; receptacle flat and naked; rays few or many, truncate but 5-toothed at the apex: achenes oval to linear, flat, plainly 3-5-ribbed on either side, the soft thin white or brown pappus elevated on a long or short beak. (Lactu-ca: from *lac*, Latin for *milk*, in allusion to the milky juice.)

**L. sativa**, L. LETTUCE. Annual erect smooth herb grown for its crisp edible highly developed radical lvs. which appear before the fl.-stalk: st. 3-4 ft., leafy, branching above: radical lvs. 5-10 in. long, thin, nearly orbicular, oblong, obovate or lingulate, plane, bullate or curled; st.-lvs. auriculate-clasping, apiculate-serrate: fl.-heads erect, 12-16-flid., with yellow rays, open in forenoon: achene ("seed") lenticular-oblong, broadest toward apex, straw-colored or black. Cultigen; probably an evolution from *L. Scariola*, L., a wide-spread weed.—Var. *crispa*, L., CURLED LETTUCE, has the loose rosette of cut, fringed or crisped lvs. Var. *capitata*, L., HEAD LETTUCE, has a very dense cabbage-like rosette.

Var. *longifolia*, Lam. (*L. romana*, Gars.). COS and ROMAINE LETTUCE. Head upright and narrow or columnar, its lvs. obovate to oblong, obtuse, 8-12 in. long, midrib very broad.

Var. *angustana*, Irish (*L. angustana*, Hort.). ASPARAGUS LETTUCE. Grown for its thick edible st., not forming a head: lower lvs. narrow-lanceolate and long-attenuate, 8-12 in. long.

**8. HIERACIUM**, L. More than 700 species mostly native to Eu. and S. Amer., variable, a few of them sometimes grown for ornament.—Perennial herbs, often hirsute, with commonly leafy sts. and rosulate tuft of basal lvs.: lvs. often toothed but never deeply lobed: heads variously paniced or rarely solitary; receptacle flat, usually naked: achenes oblong or columnar, crowned with stiff usually brownish pappus. (Hiera-cium: Greek *hawk*; it is said that the ancients thought that hawks sharpened their eyesight by using the sap of these plants.)

Heads  $\frac{1}{2}$ -1 in. across: lvs. mostly basal, obtuse and often apiculate. . . . 1. *H. aurantiacum*  
Heads  $1\frac{1}{2}$ -2 in. across: lvs. cauline as well as basal, acute. . . . . 2. *H. villosum*

**1. H. aurantiacum**, L. ORANGE HAWKWEED. DEVILS PAINTBRUSH. Somewhat stoloniferous from tufted rootstocks, hirsute with long spreading hairs, the involucre dark with black glandular hairs: lvs. mostly in a basal tuft, oblong to spatulate-oblong, 2-6 in. long, obtuse, often apiculate: heads  $\frac{1}{2}$ -1 in. across, in a naked cymose cluster at the tip of a long simple peduncle; fls. deep orange to flame color. Eu.—Now extensively introduced as a bad weed in grass lands in some parts of the country, and probably no longer cult.

**2. H. villosum**, L. SHAGGY HAWKWEED. Leafy-stemmed perennial, silky-villous throughout: lvs. acute, the basal oblanceolate, 2-4 in. long, the cauline ovate, sessile or clasping: heads  $1\frac{1}{2}$ -2 in. across, often solitary at the end of the st.; involucre without black glandular hairs; fls. bright golden. Eu.

**9. CREPIS**, L. About 200 species, mostly natives of the northern hemisphere, one a showy flower-garden subject.—Annual, biennial or perennial

herbs with mostly runcinate-pinnatifid or -toothed lvs.: heads solitary or paniculate, on long peduncles; fls. yellow, orange or red: achenes columnar to fusiform crowned with soft white pappus. (Cre-pis: Greek for *sandal*; application obscure.)

**C. rubra**, L. Branching annual  $\frac{1}{2}$ –1½ ft. high, with leafy sts. many from the base: lvs. runcinately toothed or lobed, glabrous or nearly so, the basal tapering to a narrow winged petiole, the cauline sessile: heads solitary on long peduncles; involucre hispid; fls. red, or in a hort. var. flesh-colored or whitish. Summer. Italy, Greece.

**10. GERBERA**, Gronov. (*Perdicium*, L.). Perennial herbs of S. Afr. and Asia, about 32 species, one planted for ornament.—Lvs. in a basal tuft, petiolate, entire or lobed: peduncles naked or with a few small bracts, bearing solitary heads of yellow, pink or orange fls.; rays conspicuous, in 1 or 2 rows, those of the inner row, when present, very short and sometimes tubular and 2-lipped as are the disk-fls.: achenes beaked. (Ger-bera: named in honor of Traug. Gerber, a German naturalist who traveled in Russia.)

**G. Jamesoni**, Bolus. Hairy throughout, the mature lvs. very woolly beneath: lvs. numerous, the petiole 6–8 in. long, the blade 5–10 in. long, pinnately lobed or parted: heads with showy orange-flame-colored strap-shaped rays. May. (Named after Jameson, one of the discoverers of the species.) Transvaal.

**11. ACHILLEA**, L. About 80 species in the north temp. zone, a few cult. for their ornamental fls. and foliage.—Perennial herbs or seldom subshrubs: lvs. mostly 1–3-pinnately parted, sometimes only toothed: heads commonly small and in dense clusters; involucre bracts imbricated; receptacle chaffy, convex or nearly flat; ray-fls. pistillate, fertile, yellow, white or pink; disk-fls. bisexual, fertile, commonly yellow: pappus none. (Achille-a: virtues for healing wounds said to have been utilized by Achilles.)

Fls. white to red or purplish.

Lvs. 1–2-pinnately parted: rays about 5.....1. *A. Millefolium*

Lvs. commonly toothed: rays 6–20.....2. *A. Ptarmica*

Fls. yellow.

Lvs. 1–2-pinnately parted: rays about 5.

Plant 8–10 in. high: lf.-segms. long-woolly.....3. *A. tomentosa*

Plant 4–5 ft. high: lf.-segms. pubescent.....4. *A. filipendulina*

Lvs. toothed: plant 1–1½ ft. high: rays few.....5. *A. Ageratum*

**1. A. Millefolium**, L. MILFOIL. YARROW. St. simple, leafy, 1–3 ft. high: lvs. sessile, long and narrow, 1–2-pinnately parted into linear toothed segms.: heads in flat-topped corymbs, the fls. white, or in the vars. more commonly cult. red or purplish; rays about 5. (*Millefolium*: the lvs. cut into innumerable parts; an herbalist name.) Eu., Asia, Amer.

**2. A. Ptarmica**, L. (*A. macrocephala*, Pill. & Mitterb.). SNEEZEWORT. St. simple or branched above, 1–2 ft. high: lvs. lanceolate, serrate or in one var. pinnatifid: heads in loose corymbs; fls. white (in one var. very double), the rays 6–20, as long as or longer than the involucre. Fls. all summer. (*Ptarmica*: Greek *sneeze-producing*, in reference to the use of the root for snuff; herbalist name.) North temp. regions.

**3. A. tomentosa**, L. Plants 8–10 in. high, used in rockeries: lvs. and sts. clothed with long wool: heads in rather small convex clusters; fls. yellow; rays about 5. Eu., Orient, N. Amer.

**4. A. filipendulina**, Lam. (*A. Eupatorium*, Bieb.). Stiffly erect, more or less hairy, 4–5 ft. high, the leafy sts. furrowed and glandular-spotted: lvs. as in *A. Millefolium*: fls. yellow, the heads in dense convex compound corymbs which are often 5 in. across; rays about 5. Orient.

**5. A. Ageratum**, L. Leafy-stemmed branching plant 1–1½ ft. high: lvs. fascicled, oblong, tapering to a slender petiole, toothed and the teeth serrulate: heads small, in convex-topped clusters; fls. yellow, with few rays. (*Ageratum*: from the Greek *not growing old*; herbalist and generic name.) Eu.

**12. CHRYSANTHEMUM**, L. (Incl. *Pyrethrum*, Hall. *Leucanthemum*, Mill. *Balsamita*, Desf.). Annual and perennial herbs, sometimes more or less

woody at base, mostly native in the Old World, probably 150 species, yielding major ornamental subjects to hort.—Plants mostly of erect growth and much branched, glabrous, pubescent or rarely viscid, often strong-scented, bearing usually many fl.-heads in white, pink, red, purple, yellow and intermediate colors: lvs. alternate, very various, from practically entire to lobed and multifid: heads terminating long peduncles or in corymbose clusters, many-fid., typically radiate; disk-fls. bisexual and usually fertile; ray-fls. pistillate and also mostly fertile, the rays entire or toothed; receptacle flat or convex, naked; bracts of involucre usually in several series, imbricated and appressed, the margins commonly scarious: achenes of disk- and ray-fls. much alike or those of the rays more 3-angled, all of them usually more or less striate, angled or ribbed; pappus a scale-like cup or border, or wanting. (Chrysanthemum: Greek compound *golden flower*.)

- A. The summer or flower-garden chrysanthemums, grown from seeds each year.
  - B. Achene flat, winged; outer involucral bracts keeled. .... 1. *C. carinatum*
  - BB. Achene angled and prismatic, not winged: scales not keeled.
    - c. Lvs. linear-lobed and incised, the main lower part narrowed almost to petiole-like base: achene strongly angled but without prominent intermediate ribs. .... 2. *C. coronarium*
    - cc. Lvs. not in linear lobes, the main part usually about  $\frac{1}{4}$  in. broad: achene with many deep ribs. .... 3. *C. segetum*
  - AA. The florists' autumn-blooming chrysanthemums and the similar outdoor kinds, perennial, the outdoor races grown from seeds as well as by division, the florists' or show kinds from cuttings: mostly highly developed and modified plants. .... 4. *C. morifolium*
  - AAA. The general perennial chrysanthemums and pyrethrums of hardy borders, blooming late spring, summer, autumn: plants not highly modified.
    - B. Lvs. (at least the basal ones) parted nearly or quite to the midrib.
      - c. Heads in corymbs or flat-topped more or less dense clusters.
        - d. Lf.-divisions long and narrow, often linear. .... 5. *C. corymbosum*
        - dd. Lf.-divisions short and broad, often oval or ovate. .... 6. *C. Parthenium*
      - cc. Heads single or nearly so, terminating long branches.
        - d. Foliage not glaucous.
          - e. Sts. simple or branched only at base, usually 6–15 in. high: fls. white or bluish; involucre or top of peduncle tomentose. .... 7. *C. arcticum*
          - ee. Sts. little or not at all forked, 15 or more in. high: fls. never yellow; involucre not tomentose. .... 8. *C. coccineum*
          - eee. Sts. much branched, woody at base: fls. white or light yellow; involucre not tomentose. .... 9. *C. frutescens*
        - dd. Foliage glaucous.
          - e. Involucre glabrous, the scales nearly as broad as long. .... 10. *C. anethifolium*
          - ee. Involucre tomentose, the scales twice longer than broad. .... 11. *C. cineraria-folium*
      - c. Heads large, with prominent rays, borne singly on mostly rather long sts. or branches, or at least not clustered.
        - d. Blade of basal and radical lvs. 1–2 in. long, oblong to spatulate, rounded at end. .... 12. *C. Leucanthemum*
      - dd. Blade of lowermost lvs. much longer, acute or at least tapering toward apex.
        - e. Plant much branched: lvs. very acute and also upwardly sharp-toothed. .... 13. *C. uliginosum*
        - ee. Plant little or not at all branched: lvs. blunt and bluntly toothed.
          - f. Branches none or arising low down, so that the main sts. are single-headed. .... 14. *C. maximum*
          - ff. Branches toward the top of a much taller plant, so that the main st. is 3- or more-headed. .... 15. *C. lacustre*
      - cc. Heads small and usually rayless, few or several together on short peduncles. .... 16. *C. Balsamita*

1. *C. carinatum*, L. (*C. tricolor*, Andr.). TRICOLOR CHRYSANTHEMUM. Glabrous simple or moderately forked annual, 2–3 ft.: lvs. somewhat succulent, remotely 2-pinnatifid into linear lobes that are obtuse or nearly so, little or not at all auricled on the st.: heads solitary and mostly long-peduncled,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, the rays differently colored at base so as to make a ring in the fl.-head, the disk purple, giving the heads a tricolor effect; the rays are white with ring yellow, or red with yellow ring, or brownish-purple with yellow ring, or pink with purple ring, and



other combinations as also double fls.; involucre bracts broad and hyaline-margined, the outer ones keeled: achene flat, winged or margined on either edge, not ribbed. Morocco; several garden races are in cult., known as *C. Burridgeanum* and otherwise.

2. *C. coronarium*, L. GARLAND CHRYSANTHEMUM. Often taller than No. 1, stiff and stout: lvs. not succulent, with broader and sharper-toothed divisions more closely placed, the main rachis about  $\frac{1}{2}$  in. broad, manifestly auricled on st.: heads usually smaller than those of No. 1 and more likely to be full double and globular, yellow or yellowish-white; involucre bracts not keeled: achene somewhat prismatic, strongly angled but not winged, with minor ribs between. Medit. region.—Var. *spatiosum*, Bailey, is a robust very leafy form with lvs. much less divided and more simply pinnatifid, cult. in China for the young edible lvs.; to be looked for among Chinese.

3. *C. segetum*, L. CORN CHRYSANTHEMUM. Rather sparsely foliated annual, 1–1½ ft., much-branched: lvs. notched, or when pinnatifid not deeply so, the main part  $\frac{1}{4}$  in. or more broad, the lobes broad-linear and more or less obtuse, base usually clasping, lowest ones narrowed to a petiole-like part: involucre bracts broad and obtuse, hyaline-margined: heads mostly long-peduncled, 1–2 in. across, golden-yellow, varying to white: achene prismatic but not sharply angled, the ribs all prominent. A grain and field weed in Eu., N. Afr. and W. Asia, and adventive in this country; known also as a flower-garden annual.

4. *C. morifolium*, Ram. (*C. sinense*, Sabine. *C. hortorum*, Bailey). FLORISTS CHRYSANTHEMUM. Cultigen: perennial, but propagated annually by florists, by means of cuttings, for late autumn bloom; another group is grown only in the open, formerly under the name of "artemisia" but latterly considerably varied and improved under the name of "hardy chrysanthemums": a group-species of well-known plants of undetermined origin, stout, erect, much-branched, gray-pubescent to tomentose, with characteristic strong odor: lvs. mainly ovate in outline, the blade 2–6 in. long, usually with 2 prominent lobes on either side and various secondary lobes, the parts broad and obtuse or narrow and laciniate and acute, short-petioled: fl.-heads mostly several together but often grown to single sts. by disbudding; involucre variously pubescent, the bracts oblong, broadly hyaline-margined and the outer ones green-centered, in size from 1 in. or less in the little pompons to 1 ft. in the great show kinds; rays of practically all colors and of endless forms, in some races the heads full double with homogeneous rays and in others with specially developed tubular fls. in the center producing the anemone kinds. Supposedly of Chinese origin, but the original species from which it may have come undetermined; perhaps it has admixture of *C. indicum*, L., a yellow-rayed species of China and Japan.

5. *C. corymbosum*, L. (*Pyrethrum corymbosum*, Willd.). Stout perennial, 1–4 ft., much-branched toward the top, nearly or quite glabrous: lvs. tansy-like, 4–6 in. long, 2-pinnatisect into linear acute and sharp-toothed lobes, the lower ones petiolate: heads many and small in a flat-topped cluster, about  $\frac{3}{4}$  in. across, slender-peduncled, the rays white; bracts oblong, green-centered and brown-margined. Medit. region.

6. *C. Parthenium*, Pers. (*Matricaria Parthenium*, L. *Pyrethrum Parthenium*, Sm.). FEWERFEW. Bushy, much-branched, leafy, nearly glabrous, strong-scented perennial, 1–3 ft., some of the forms very dwarf and compact and sometimes curled-leaved and yellow-foliaged (Golden Feather), suitable for edgings: lvs. broad-ovate to oblong-ovate in outline, the lower ones pinnate and then pinnatisect, the upper ones deeply pinnately parted, the segms.  $\frac{1}{4}$  in. or so broad and variously toothed, obtuse or nearly so: heads many and aggregated,  $\frac{3}{8}$ – $\frac{3}{4}$  in. across, disk yellow and rays white; in some forms the heads are discoid and in others double (all fls. rayed); involucre mostly lightly pubescent, outer bracts green-centered. (Parthenium is an ancient name suggesting reputed medicinal merits.) Eu. to Caucasus; also more or less spontaneous in this country; an old garden favorite.

7. *C. arcticum*, L. (*Leucanthemum arcticum*, DC.). Autumn-blooming perennial, forming a clump, pubescent at least above, the sts. simple or branched near base, 6–12 or sometimes 18 in.: lvs. spatulate in outline, 1–3 in. long, long-narrowed to base, primarily 3-lobed or -cleft with secondary lobing, the uppermost becoming linear bracts: heads solitary, 1–2 in. across, white tinged rose or lilac, numerous and attractive; involucre with tomentum that covers the top of the peduncle, bracts brown-margined and green-centered. High north and arctic regions.

8. *C. coccineum*, Willd. (*Pyrethrum roseum*, Hort. *P. hybridum*, Hort.). COMMON PYRETHRUM. Popular perennial producing a clump of finely cut very

green foliage and sending up simple or sparingly forked nearly or quite glabrous sts. usually 16-30 in. tall, bearing bright heads in late spring and summer: lvs. thin, long and narrow, the lower ones 5-15 in. long with the long petiole and 3 or 4 in. broad, pinnate and the pinnæ pinnatifid and segms. cut, upper st.-lvs. simply pinnatifid and sessile: heads solitary, large,  $1\frac{1}{2}$ -3 in. across, the long rays white, pink, lilac, crimson, dark red (*atrosanguineum*), but not true yellow, sometimes full and double, sometimes with developed tubular fls. on the disk producing anemone forms; involucre bracts rather narrow, brown-margined. S. W. Asia; the botany of the group is not clear.

9. *C. frutescens*, L. MARGUERITE or PARIS DAISY. Much-branched bush, woody at base, glabrous, 2-3 ft., producing heads freely on slender peduncles well above the foliage: lvs. thickish, oblong to ovate in outline, 2-4 in. long, petioled, 2-pinnatifid, the segms. all very sharp: heads solitary,  $1\frac{1}{2}$ -2 in. across, with long narrow white or sometimes lemon-yellow rays; involucre bracts very broad and widely hyaline-margined. Canaries; apparently not all the stock passing as Marguerite is of this species.

10. *C. anethifolium*, Brouss. Differs from No. 9 in the glaucous finer foliage: lvs. shorter-petioled, the segms. narrow-linear and usually more deeply cut as well as more separated or distant: fls. white but recorded as sometimes lemon-yellow. Canaries; now seldom seen in cult.

11. *C. cinerariæfolium*, Vis. Slender, glaucous, pubescent perennial interesting as a source of insect powder and sometimes cult. for ornament; sts. 12-30 in. high, simple, overtopping the fine foliage: lvs. 6-12 in. long, including petiole, oblong or oval in outline, pinnate and then pinnatifid into linear acute segms.: heads about  $1\frac{1}{2}$  in. across, on long slender peduncles or sts., solitary, the oblancheolate obtuse veined rays white; involucre bracts oblong, very obtuse, hyaline-tipped and darker-centered, pubescent. Dalmatia.

12. *C. Leucanthemum*, L. OX-EYE DAISY. WHITEWEED. Weedy perennial, nearly or quite glabrous; sts. 1-3 ft., simple or sparingly branched, bearing terminal heads 1-2 in. across with white rays: lvs. largely basal and radical, the blades mostly 1-2 in. long and spatulate or obovate with rounded end, strongly toothed or toward base incised-pinnatifid, the st.-lvs. incised-toothed, sessile and clasping. (*Leucanthemum* is an ante-Linnæan name meaning *white flower*.) A common weed eastward, naturalized from Eu. and Asia; probably not regularly cult., although perhaps appearing in gardens; stock sometimes known under this name is likely to be *C. maximum*.

13. *C. uliginosum*, Pers. Very tall perennial, 4-7 ft., much-branched and finely pubescent above, with aspect of a big aster: lvs. long-lanceolate, very sharp-pointed and sharply upward-toothed, the st.-lvs. mainly sessile: heads many, on rather short leafy peduncle or sts. in autumn,  $1\frac{1}{2}$ -3 in. across, the narrow obtuse rays white; involucre bracts long-oblong, hyaline-tipped and green-centered. Eu.

14. *C. maximum*, Ram. Short-lived perennial, sometimes treated as a biennial; sts. 12-30 in., erect, simple or sparingly long-forked, somewhat pubescent becoming smooth: lvs. long-oblancheolate, the radical ones often 1 ft. long, upper ones successively shorter and becoming lanceolate, coarsely and bluntly toothed, obtuse at end, the st.-lvs. usually 1 in. or less broad: heads appearing in summer and autumn, terminating the long sts., 2-3 in. across, with broad and obtuse white rays; involucre bracts broad-oblong, obtuse, hyaline-margined, more or less brown- or green-centered: pappus none. Pyrenees.—Now known in several large-headed forms, 4 in. or more across, including the Shasta Daisy; some of the forms have serrate, fringed or drooping rays.

15. *C. lacustre*, Brot. (*C. latifolium*, DC.). A taller plant than No. 14, 3-6 ft., branched toward top so that the fl.-sts. are relatively shorter: lvs. mostly broader and less narrowed at base: pappus of ray fls. 2-3-eared. Portugal.

16. *C. Balsamita*, L. COSTMARY. MINT-GERANIUM. Persistent perennial, kept in old yards for the sweet odor of its foliage, sometimes erroneously called "lavender"; sts. stiff, 2-4 ft., finely pubescent, much-branched along the sides, bearing many little heads on very short peduncles: lvs. oblong or oval, 2-6 in. long or the radical ones longer, obtuse, finely and obtusely serrate, often with a pair of small narrow lobes at base: heads  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, usually yellowish and rays absent but sometimes with a few white rays; involucre bracts oblong, narrow, hyaline, obtuse: pappus a small crown. (The word *Balsamita* is an old substantive, from the balsamic odor.) W. Asia, and more or less escaped in N. Amer.

13. **MATRICARIA**, L. (Incl. *Chamomilla*, Gilib.). **MATRICARY**. About 50 species, natives of S. Afr., the Medit. region, and the Orient, some of them

grown as ornamentals.—Annual, biennial or perennial herbs, often strongly scented: lvs. 1–3 times finely dissected: heads peduncled, the disk-fls. yellow, those of the ray white or sometimes wanting; involueral bracts in few series; receptacle conical or ovoid, naked: achenes 3–5-ribbed on the face or sides, rounded on the back. (*Matricaria: mater*, mother, from its medicinal use.)

Lvs. distinctly petiolate, the ultimate lf.-segms. ovate or oblong.....1. *M. parthenoides*  
Lvs. (except the lower) sessile or very shortly petiolate; ultimate lf.-segms. narrowly linear.

Heads  $1\frac{1}{2}$  in. across: achenes with 3 conspicuous ribs.....2. *M. inodora*

Heads nearly 1 in. across: achenes faintly 3–5-ribbed.....3. *M. Chamomilla*

1. *M. parthenoides*, Desf. (*M. capensis*, Hort., not L.). Bushy annual or (under cult.) biennial, soft-hairy when young becoming glabrate, to 2 ft. high: lvs. petiolate, pinnately parted, the ovate or oblong ultimate segms. often 3-toothed: heads white,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, loosely corymbose, often double, blooming till frost: achenes strongly ribbed, the pappus a minute toothed border. Old World.

2. *M. inodora*, L. Diffuse branching annual, 1–2 ft. high, glabrous or nearly so, little or not at all scented: lvs. many, sessile, 2–3-pinnately divided into short narrowly linear segms.: heads  $1\frac{1}{2}$  in. across, on peduncles terminating the branchlets, the many white rays acute: achenes inversely pyramidal with 3 conspicuous ribs; pappus a minute entire or 4-toothed border. Eu.

3. *M. Chamomilla*, L. WILD CHAMOMILE. Glabrous erect much-branched annual: lvs. 2–3-pinnately dissected into short very narrowly linear segms.: heads nearly 1 in. across, on short terminal peduncles, with 10–20 truncate white rays; involueral bracts about equal, the edges scarious; receptacle without scales, elongating and becoming hollow as anthesis advances: achenes with 3–5 faint ribs; pappus wanting. (*Chamomilla*: Greek *earth apple*, because of the small round heads which are said to smell like apples.) Eu., N. Asia.

14. **ANTHEMIS**, L. Species about 100, native to Eu. and the Medit. region, two or three planted for ornament.—Annual, biennial or perennial herbs with strongly-scented herbage: lvs. 1–3-pinnately dissected: heads on slender peduncles terminating the branches, many-fld., the disk yellow, the rays white or yellow and (in ours) pistillate; receptacle conical, chaffy: achenes angled or ribbed; pappus a minute crown or lacking. (*Anthemis*: Greek name of the chamomile.)

Rays normally yellow: ultimate lf.-segms. oblong or ovate.....1. *A. tinctoria*  
Rays white: ultimate lf.-segms. narrowly linear.....2. *A. nobilis*

1. *A. tinctoria*, L. GOLDEN MARGUERITE. Bushy perennial 2–3 ft. high, with angular st., used as a border plant and for cut fls.: lvs. pinnately divided, the segms. pinnatifid into ovate or oblong toothed lobes: heads 1–2 in. across, golden-yellow (white-fld. in a var. sold under the name *A. montana*): achenes quadrangular. Summer. Eu., Asia.—*A. Kelwayi*, Hort., has more finely cut foliage and deeper yellow fls.

2. *A. nobilis*, L. CHAMOMILE. Half-spreading much-branched perennial herb, downy and pleasantly aromatic, cult. for medicinal purposes and as a border plant: lvs. very finely dissected: chaff of the receptacle blunt; rays white (in one var. yellow): achenes obtusely 3-angled; pappus wanting. Summer and fall. Eu.

15. **TANACETUM**, L. TANSY. Odorous annual or perennial herbs, of the northern hemisphere, about 35 species, with 7 native to N. Amer., yielding one old garden plant.—Lvs. alternate, dissected or entire: heads yellow, small to medium-sized, disk-shaped, corymbosely clustered or rarely solitary; involueral bracts in many series; pistillate fls. with 3–5-toothed tubular corollas: achenes 5-ribbed or 3–5-angular, with broad truncate summit, bearing a coroniform pappus or none. (*Tanacetum*: name of doubtful derivation.)

*T. vulgare*, L. (*Chrysanthemum vulgare*, Bernh.). COMMON TANSY. Robust erect perennial, 2–3 ft. high: lvs. pinnately divided into oblong or lanceolate segms. which are sharply serrate or pinnately cut: heads  $\frac{1}{4}$ – $\frac{1}{2}$  in. across, numerous, in a dense flat-topped cyme; ray-corollas inconspicuous, with oblique 3-toothed limb. Eu.—Formerly grown for medicinal purposes and for its use as a seasoning; still common about yards and also escaped.

16. **ARTEMISIA**, L. A genus of about 200 species, mostly in the northern hemisphere and most abundant in arid regions, several grown for ornament and also for medicinal and aromatic qualities.—Herbs or low shrubs, bitter-aromatic: lvs. alternate, often dissected: heads wholly discoid, small and inconspicuous, numerous, paniculately disposed and generally nodding; fls. yellow or whitish, the involucre imbricated in several rows: achenes without pappus. (*Artemis-ia*: in mythology, *Artemisia*, wife of *Mausolus*.)

St.-lvs. simple.

Lvs. and sts. green and nearly glabrous..... 1. *A. Dracunculus*

Lvs. and sts. white-woolly..... 2. *A. Purshiana*

St.-lvs. variously lobed or dissected.

Plants green and glabrous.

Lvs. finely dissected..... 3. *A. Abrotanum*

Lvs. coarsely lobed or divided..... 4. *A. lactiflora*

Plants more or less whitened with hairy covering (green in *A. sacrorum* var. *viride*).

Lvs. finely dissected.

Heads in a long open panicle; fls. both bisexual and pistillate.... 5. *A. pontica*

Heads in separate slender racemes; fls. all bisexual..... 6. *A. sacrorum*

Lvs. coarsely lobed or divided.

Upper and lower surfaces of lf. white or silky with hairy covering.

Pubescence silky: heads  $\frac{1}{8}$  in. across..... 7. *A. Absinthium*

Pubescence woolly: heads  $\frac{1}{4}$  in. across..... 8. *A. Stelleriana*

Upper surface of lf. green and glabrous, the lower tomentose.... 9. *A. vulgaris*

1. ***A. Dracunculus***, L. **TARRAGON**. **ESTRAGON**. Green glabrous herb, 2 ft. high, with erect branched sts.: basal lvs. 3-parted at tip; st.-lvs. linear or lanceolate, entire or small-toothed: heads whitish-green, nearly globular,  $\frac{1}{8}$ – $\frac{1}{2}$  in. across, in a spreading panicle; fls. of two kinds, pistillate and bisexual, the latter sterile; style usually entire. (*Dracunculus*: *little dragon*, the root coiled serpent-like; an herbalist name.) Eu.—Cult. for its lvs., which are used for seasoning.

2. ***A. Purshiana***, Bess. (*A. gnaphalodes*, Nutt., not Hort.). Sts. and lvs. white-woolly on both sides: lvs. simple, acute or acuminate, overtopped by the spicate-paniculate infl.: heads white; receptacle not hairy; bisexual fls. fertile; style 2-cleft. (Named for F. T. Pursh, 1774–1820, German botanist who traveled in N. Amer.) Missouri River to Pacific.

3. ***A. Abrotanum***, L. **SOUTHERNWOOD**. **OLD MAN**. Green and glabrous subshrub to 5 ft. high, the st. much-branched and rather strict: lvs. 1–3-pinnately divided, the divisions fine-filiform: heads yellowish-white, in a loose panicle; receptacle not hairy; bisexual fls. fertile; style 2-cleft. (*Abrotanum*: from the Greek *elegant*, in reference to the form of the lvs. and their aromatic odor; herbalist name.) Eu.

4. ***A. lactiflora***, Wall. Erect, the sts. and main veins of the lvs. somewhat hispidulous-roughened, otherwise glabrous: st.-lvs. pinnatifid or pinnately parted into large, broad-lanceolate, toothed or incised segms.: heads slightly more than  $\frac{1}{2}$  in. across, loosely paniced; bisexual fls. fertile. China.—Perhaps better disposed of as a var. of *A. vulgaris*.

5. ***A. pontica***, L. **ROMAN WORMWOOD**. Erect, shrubby, 1–4 ft. high: lvs. canescent below, pinnatisect into linear lobes: heads whitish-yellow, globular, about  $\frac{1}{8}$  in. across, nodding, borne in a long open panicle; receptacle not hairy; bisexual fls. fertile; style 2-cleft. Eu.

6. ***A. sacrorum***, Ledeb. Annual or biennial, shrubby below: lvs. ovate, long-petioled, hoary or white-pubescent (green in var. *viride*, known as Summer-Fir, grown for its pyramidal form and much dissected rich green foliage), pinnatisect and the segms. again pectinate, the rachis winged: heads 15–20-fld., nodding, in separate slender racemes; receptacle not hairy; fls. all bisexual. Late summer and autumn. Russia, Siberia, etc.

7. ***A. Absinthium***, L. **WORMWOOD**. **ABSINTHIUM**. Spreading and branchy almost shrubby plant, 2–4 ft. high, white-silky: lvs. 2–3-parted into oblong obtuse lobes: heads  $\frac{1}{8}$  in. across, numerous, in leafy panicles; receptacle hairy; bisexual fls. fertile; style 2-cleft. Late summer. (*Absinthium*: Latin name of wormwood, associated with its bitter taste; also herbalist name.) Eu.—Cult. for use as a domestic medicine.

8. ***A. Stelleriana***, Bess. (*A. ludoviciana*, Hort.). **OLD WOMAN**. **DUSTY MILLER**. **BEACH WORMWOOD**. Densely white-tomentose herb, 2 ft. high, from a creeping woody base: lvs. pinnatifid, the lobes obtuse: heads  $\frac{1}{4}$  in. across, many-fld., in a



racemose-glomerate infl.; receptacle not hairy; bisexual fls. fertile; style 2-cleft. (Bears name of Steller, Russian botanist.) N. E. Asia, Atlantic coast from Mass. to Del.—Used as a border plant; also a family remedy.

9. *A. vulgaris*, L. MUGWORT. Erect paniculately branched herb, the sts. often purplish; lvs. fragrant, white-cottony beneath, soon green above, 2-pinnately cleft into lanceolate lobes; upper lvs. sometimes linear: heads many, oblong, yellowish,  $\frac{1}{8}$ – $\frac{1}{4}$  in. across, spicate-paniculate; receptacle not hairy; bisexual fls. fertile; style 2-cleft. Eu.—Grown for its ornamental foliage, some vars. having variegated and golden lvs. A white-fl'd. ornamental form with fragrant foliage has been sold as *A. lactiflora*.

17. *SANTOLINA*, L. Shrubs or rarely herbs of about 8 species, mostly from the Medit. region, one frequent as a low border or edging plant.—Herbage aromatic; lvs. alternate, pinnately toothed or lobed or finely divided: heads many-fl'd., of disk-fls. only, yellow or rarely white, on long peduncles; involucre mostly campanulate, the bracts imbricated, appressed. (Santolina: derivation of name doubtful.)

S. *Chamæcyparissus*, L. (*S. incana*, Lam.). LAVENDER-COTTON. Much-branched evergreen subshrub  $1\frac{1}{2}$ –2 ft. high, silvery-gray and tomentose; lvs. pinnately divided into minute ovate-oblong segms.: heads yellow, globular, solitary, terminal,  $\frac{1}{2}$ – $\frac{3}{4}$  in. diam.: achenes without pappus. Summer. (Chamæcyparissus: Greek dwarf and cypress, the lvs. resembling those of the cypress.) Medit. region.

18. *ECHINACEA*, Moench (*Brauneria*, Neck.). PURPLE CONEFLOWER. Five species in N. Amer., more or less grown in the border or wild-garden.—Coarse perennial herbs with thick black roots of pungent taste and stout erect sts.: lvs. alternate, simple, the lower long-petioled: heads large, solitary, on long peduncles terminating the st. and few branches; involucre bracts lanceolate, herbaceous, imbricated in 2 or more series, finally reflexed; disk convex becoming ovoid; bracts of the receptacle persistent, narrowed to a rigid cusp surpassing the disk-fls.; rays rose-purple or rose-color, withering-persistent: achenes quadrangular; pappus a thick crown, toothed at the angles. (Echina-cea: Greek for hedgehog, alluding to the sharp-pointed bracts of the receptacle.)

Lvs. ovate to ovate-lanceolate, commonly denticulate or serrate..... 1. *E. purpurea*  
Lvs. broadly lanceolate to nearly linear, entire..... 2. *E. angustifolia*

1. *E. purpurea*, Moench. Stout coarse perennial herb 2–3 ft. high, smooth and glabrous or rough with short hispid hairs: lvs. ovate-lanceolate or the lower broadly ovate, commonly denticulate or serrate, with short winged petiole, or the lower with elongate barely margined petiole: heads solitary on stout terminal naked peduncles; involucre well-imbricated, in 3–4 series; rays purple (rarely almost white), broadish, at first 1 in. long, becoming 2 in. long or more, 2-toothed at apex; disk purplish, convex becoming ovoid; bracts of the receptacle persistent, ending in a stout cusp, exceeding the disk-fls. Va. and O. to Ill. and La.

2. *E. angustifolia*, DC. Mostly simple, 1–2 ft. high, sparsely or densely hispid: lvs. broadly lanceolate to nearly linear, entire, all attenuate at base, the lower into slender petioles: involucre bracts in about 2 series; heads and fls. nearly of *E. purpurea*, or sometimes much smaller; fruiting disk often 1 in. high. Sask. and Neb. to Tex., east to Ill., Tenn. and Ala.

19. *MADIA*, Molina. TARWEED. Twelve herbaceous species native to W. N. Amer. and 1 to Chile, little known to cult.—Glandular and viscid, mostly heavy-scented: lvs. entire or merely toothed, some or all of them alternate: heads axillary or terminal, the yellow fls. closing in the sunshine; ligules 3-lobed; involucre bracts in 1 series, infolded around the ray-achenes; bracts of receptacle in a single series between the disk- and ray-fls. (Madiæ, the Chilean name of the common species.)

M. *sativa*, Molina. Annual, 1–3 ft. high: lvs. alternate, broadly lanceolate to linear: heads short-peduncled or sessile; rays 5–12, with honey-yellow ligules not

$\frac{1}{4}$  in. long. Weed in Ore., Calif., Chile, perhaps native of S. Amer.—Said to be useful forage in sheep-pastures and seed offered.

20. **LAYIA**, Hook. & Arn. Low annual herbs of about 14 species in W. N. Amer., several cult. for their showy fls.—Simple or branching, flowering in spring or early summer: lvs. chiefly alternate, all entire or some, particularly the lower, pinnately toothed or lobed: heads showy, solitary, on peduncles terminating the st. or branches; rays 8–20, yellow or white, with 3-toothed ligules; disk-fls. with 5-toothed tubular corolla; receptacle bearing a series of chaffy bracts between the ray- and disk-fls., sometimes additional ones among the disk-fls.: ray-achenes without pappus, inclosed by the involucrel bracts; disk-achenes with or without pappus. (Lay-ia: Geo. T. Lay, flourished about 1825–1843, naturalist in Beechey's voyage.)

Rays yellow, sometimes white-tipped; involucrel bracts unequal..... 1. *L. elegans*  
Rays entirely white; involucrel bracts equal or nearly so..... 2. *L. glandulosa*

1. **L. elegans**, Torr. & Gray. TIDY TIPS. Diffuse branching annual, more or less hirsute-pubescent throughout: lvs. oblong or spatulate, toothed or pinnatifid, alternate, or the upper often entire and opposite: heads large and showy, on naked peduncles; involucrel bracts very unequal, the longer alternating with the shorter; rays 10–12,  $\frac{1}{2}$  in. long, yellow or sometimes white-tipped (pure white in one var.); disk yellow: pappus of stiff bristles and shorter soft interlaced hairs. Calif.

2. **L. glandulosa**, Hook. & Arn. WHITE DAISY. Simple or diffusely branched annual  $\frac{1}{2}$ –2 ft. high, hirsute and with stipitate black glands especially towards the heads: lvs. alternate, oblong to linear-oblong, the lower toothed or pinnatifid, the upper entire: heads  $1\frac{1}{2}$  in. across, on leafy peduncles; involucrel bracts equal or nearly so; rays 8–13, white or sometimes tinged with rose: pappus of straight bristles and interlaced woolly hairs. B. C. to Ida. and Mex.

21. **LEPTOSYNE**, DC. Seven species, native to S. W. U. S., all but 1 Californian; several cult. for their showy fls.—Smooth glabrous herbs or subshrubs: lvs. alternate or the lowest opposite, usually rather fleshy, ternately or pinnately divided or dissected: heads showy, pedunculate, with both the ray- and disk-fls. bright yellow, the rays mostly pistillate, the disk-fls. with a ring on the corolla-tube at its juncture with the throat. (Leptos-yne: Greek *slenderness*.)

Plant annual: heads not over  $1\frac{1}{2}$  in. across; rays more or less 3-lobed.

Ring of disk-fls. usually bearded: achenes rough with short rigid bristles.....

..... 1. *L. Douglasii*  
Ring of disk-fls. beardless: achenes not hairy..... 2. *L. Stillmanii*

Plant perennial: heads  $2\frac{1}{2}$  in. or more across; rays obscurely 3-toothed... 3. *L. maritima*

1. **L. Douglasii**, DC. (*L. californica*, Nutt. *Coreopsis Douglasii*, Hall). Annual, 9–12 in. high, leafy only at or near base: lvs. 1–3-parted into nearly filiform divisions: heads solitary, long-stalked, about  $1\frac{1}{4}$  in. across; rays bright yellow, showy; ring of disk-fls. usually distinctly bearded: achenes roughened with short rigid bristles, corky-winged. (First collected by David Douglas, botanical explorer, page 459.) S. Calif. and Ariz.

2. **L. Stillmanii**, Gray (*Coreopsis Stillmanii*, Blake). Stoutier, more leafy below: lf.-lobes linear: heads larger; rays more or less 3-lobed; ring of the disk-fls. beardless: achenes smooth and naked on the back, the corky wing somewhat roughened. (First collected by Stillman.) S. Calif.

3. **L. maritima**, Gray (*Coreopsis maritima*, Hook. f.). SEA-DAHLIA. Perennial with low sts. from a thick base: lvs. bipinnately divided into narrowly linear lobes: heads  $2\frac{1}{2}$  in. or more across, solitary, on peduncles 9–12 in. long terminating the branches; rays 16–20,  $1\frac{1}{2}$  in. long, obscurely toothed; ring of disk-corollas beardless: achenes smooth and glabrous, with obscure wing-like margin. Spring. S. coast Calif.—Some of the stock in the trade may be *L. calliopsidea*, Gray, which differs in being an annual with rays fewer, shorter and broader and with hairy achenes.

22. **RUDBECKIA**, L. CONEFLOWER. Coarse summer-flowering herbs, native in N. Amer., a number cult. for their showy fls.; about 30 species.—

Mostly perennial, sometimes annual or biennial: lvs. alternate, simple or compound: heads pedunculate, commonly showy, terminating the st. and branches; involucre often foliaceous, loose; rays yellow, sometimes with brownish base, often becoming reflexed; disk hemispheric to columnar, greenish or yellowish to purplish-black: pappus crown-like, cup-shaped or none. (Rudbeckia: the two professors Rudbeck, father and son, 17th and 18th centuries.)

- A. Base of upper lvs. cordate- or subcordate-clasping.
- B. Plant annual, 1-2 ft. high. .... 1. *R. amplexicaulis*
- BB. Plant perennial, 4-9 ft. high. .... 2. *R. maxima*
- AA. Base of upper lvs. not cordate-clasping.
- B. Disk greenish or yellowish.
- C. Margin of lvs. entire or barely dentate. .... 3. *R. nitida*
- CC. Margin of lvs. (upper st.-lvs.) 3-cleft. .... 4. *R. laciniata*
- BB. Disk brown or dark purple.
- C. Lower lvs. deeply 3-cut.
- D. Plant biennial: st.-lvs. subsessile: disk black-purple. .... 5. *R. triloba*
- DD. Plant perennial: st.-lvs. distinctly petiolate: disk dull brownish. 6. *R. submentosa*
- CC. Lower lvs. not deeply 3-cut.
- D. Pubescence harsh, more or less spreading.
- E. Rays  $\frac{1}{2}$ -1 in. long: lvs. nearly entire, mostly obtuse. .... 7. *R. bicolor*
- EE. Rays 1-2 in. long: lvs. commonly not entire, acute.
- F. Lvs. coarsely and irregularly serrate, the upper ovate-lanceolate. .... 8. *R. speciosa*
- FF. Lvs. more finely and regularly serrate, oblong-lanceolate. 9. *R. hirta*
- DD. Pubescence fine and closely appressed: lvs. mostly entire. .... 10. *R. fulgida*

1. *R. amplexicaulis*, Vahl. Glabrous, somewhat glaucous, leafy, branching annual, 1-2 ft. high: lvs. entire to sparingly serrate, the lower oblong-spatulate and sessile, the upper oblong or ovate, cordate-clasping: heads solitary, rather showy, terminating the branches; involucre bracts few, small, foliaceous; rays oblong,  $\frac{1}{2}$  in. or more long, yellow, often with a brown-purple base; disk brownish, cylindrical in age. La. and Tex.

2. *R. maxima*, Nutt. Glabrous glaucous perennial 4-9 ft. high: lvs. broadly ovate to oblong, mostly obtuse, minutely toothed or entire, the larger to 1 ft. long; upper st.-lvs. cordate-clasping: heads solitary or few, long-peduncled; rays yellow, 1-2 in. long, drooping; disk brownish, conic or columnar, 1-2 in. long. Ark., La., Tex.

3. *R. nitida*, Nutt. Perennial with st. simple or nearly so, 2-4 ft. high: lvs. bright green, entire or minutely toothed, the basal and lower cauline ovate-spatulate to lanceolate-oblong, petioled, the upper oblong to lanceolate, mostly acute, sessile, 3-6 in. long: heads solitary or few, long-peduncled; rays several or numerous, pure yellow, drooping; disk finally columnar, 1-2 in. long. Ga. to Fla. and Tex.

4. *R. laciniata*, L. Branching perennial 2-7 ft. high, smooth and glabrous or more or less roughened with short stiff hairs: lvs. broad, the basal pinnately divided into 5-7 often 2-3-cleft segms.; st.-lvs. 3-5-parted or -cleft, those of the branches few-toothed or entire: heads solitary or few, long-peduncled; involucre bracts loose and irregular, foliaceous; rays yellow, few or several, oblanceolate, soon drooping. Autumn. Que. to Fla. west to Man. and New Mex.—Var. *hortensia*, Bailey. GOLDEN-GLOW. A full double form common in cult.

5. *R. triloba*, L. BROWN-EYED SUSAN. Bright green glabrous or sparsely short-hispid biennial blooming the first year, 2-5 ft. high: basal lvs. petiolate, the st.-lvs. ovate-lanceolate to broader, with cuneate subsessile base, coarsely serrate, or the upper lanceolate and nearly entire, the lower 3-lobed or -parted: heads short-peduncled; involucre bracts foliaceous, mostly linear, unequal, in 1-2 series, soon reflexed; rays 8-10,  $\frac{1}{2}$ -1 in. long, deep yellow or with orange or brown-purple base; disk black-purple, ovoid at maturity. N. J. to Mich., south to Ga., La. and Mo.; grown as an annual.

6. *R. submentosa*, Pursh. Leafy pubescent perennial, 2-5 ft. high, branching above: lvs. nearly all petioled, serrate, ovate or 3-lobed and the terminal lobe ovate: involucre bracts foliaceous, soon reflexed; rays numerous, 1-1 $\frac{1}{2}$  in. long, yellow, sometimes with dark base; disk dull brownish, hemispheric, becoming higher,  $\frac{1}{2}$  in. broad. Ill. to Tex.

7. *R. bicolor*, Nutt. Bristly annual, simple or branching, 1-2 ft. high: lvs. lanceolate to oblong or obovate, mostly sessile and nearly entire, 1-2 in. long: rays  $\frac{1}{2}$  to barely 1 in. long, wholly yellow or with lower half or base dark-colored; disk black,  $\frac{3}{4}$  in. high. Ark. and Tex. east to Ga.—A hort. var. has heads 2 in. across, rays yellow above, purplish-brown below.

8. *R. speciosa*, Wenderoth (*R. Newmani*, Loud.). Perennial 1-3 ft. high, sparsely or not at all hairy, the spreading branches ending in long naked peduncles: basal and lower st.-lvs. oblong or ovate, petiolate, the upper ovate-lanceolate to lanceolate, irregularly serrate: rays 12-20, yellow, often orange at base, at length  $1\frac{1}{2}$  in. long; disk  $\frac{2}{3}$ - $\frac{3}{4}$  in. high at maturity. Pa. to Mich., Ark. and Ala.; somewhat planted.

9. *R. hirta*, L. BLACK-EYED SUSAN. YELLOW DAISY. Rough-hairy biennial or sometimes annual, 1-3 ft. high: lvs. oblong to lanceolate, serrate to subentire, 2-5 in. long, the lower with margined petioles: rays golden-yellow or sometimes deeper colored toward base, 1-2 in. long; disk nearly black becoming dull brown, finally ovoid. Common in U. S. and Canada.

10. *R. fulgida*, Ait. Hairy perennial, 1-2 ft. high (vars. more or less): lvs. mostly entire, narrowly to oblong-lanceolate, the lowest and basal spatulate-lanceolate, petiolate: foliaceous bracts of involucre often wide,  $\frac{1}{2}$ -1 in. long; rays 12-14, golden-yellow or with orange base (yellow and brown in one var.), as long as the bracts; disk black-purple, over  $\frac{1}{2}$  in. diam., at length globose-ovoid. Pa. to Mo., south to La. and Tex.

23. **HELIANTHUS**, L. SUNFLOWER. Mostly a N. American genus of about 60 species, a number grown as ornamentals and one for its edible tubers.—Rather coarse annual or perennial herbs: lvs. simple, usually opposite below and alternate above: heads solitary or corymbed, on peduncles terminating the st. and branches; involucre bracts in 2-several series, the outer often leafy at tips; ray-fls. neutral, yellow, sometimes absent; disk-fls. bisexual, yellow, brown or purplish: pappus early deciduous; summer and autumn bloomers. (*Helianthus*: Greek *helios*, the sun, and *anthos*, a flower.)

- A. Plant annual: lvs. long-petioled: disk brown or purplish.
  - B. St. erect, stout, simple or branching above: heads 3-6 in. or more across.
    - c. Pubescence rough..... 1. *H. annuus*
    - cc. Pubescence usually silky..... 2. *H. argophyllus*
    - BB. St. diffuse, slender, branching freely from base: heads 2-3 in. across.... 3. *H. debilis*
  - AA. Plant perennial by creeping rootstocks: lvs. mostly sessile or short-petioled (*H. decapetalus* rather long-petioled).
    - B. Disk brown or purplish.
      - c. Lvs. linear, entire, sessile (except the lower)..... 4. *H. orgyalis*
      - cc. Lvs. ovate to broad-lanceolate, mostly toothed, wing-petioled.
        - d. Rays numerous, about  $1\frac{1}{2}$  in. long: heads  $2\frac{1}{2}$ -4 in. across.... 5. *H. scaberrimus*
        - dd. Rays 10-16, about 1 in. long: heads about 2 in. across..... 6. *H. atrorubens*
    - BB. Disk yellowish.
      - c. St. smooth below, the branches slightly rough or pubescent..... 7. *H. decapetalus*
      - cc. St. rough or hairy below.
        - d. Rootstocks thickened into 1 or more fleshy tubers.
          - e. Lvs. prevalingly lanceolate.
            - f. Rays pale yellow, barely 1 in. long..... 8. *H. giganteus*
            - ff. Rays golden-yellow, often  $1\frac{1}{2}$  in. long..... 9. *H. Maximiliani*
          - EE. Lvs. prevalingly ovate..... 10. *H. tuberosus*
        - DD. Rootstocks all slender.
          - e. Lower lvs. cordate-clasping..... 11. *H. mollis*
          - EE. Lower lvs. short-petioled..... 12. *H. latiflorus*

1. *H. annuus*, L. COMMON SUNFLOWER. Robust rough-hairy annual, 3-12 ft. high; st. often mottled: lvs. long-petioled, ovate, acute or acuminate, 4-12 in. long, serrate, the lower cordate: heads 3-6 in. wide in wild specimens, sometimes 14 in. in cult.; involucre bracts ovate or oblong, acuminate-caudate at tip; receptacle flat or nearly so; disk brownish-purple. July-Sept. Minn. to Tex. west to Wash. and Calif.—Grown for economic and ornamental purposes. Several hort. forms occur, differing in size of heads, color of rays and in the extent of multiplication of rays in so-called double heads. Some very double heads are 5 in. and more across.

2. *H. argophyllus*, Torr. & Gray. SILVERY-LEAVED SUNFLOWER. Annual, the usually solitary st. 4-5 ft. high, soft gray with dense silky pubescence, especially on the upper branches; involucre densely silky, the bracts ovate, acuminate; otherwise like *H. annuus* into which it seems to vary under cult. if the seedlings are not constantly selected for their silky character. Autumn. Tex.

3. *H. debilis*, Nutt. (*H. cucumerifolius*, Torr. & Gray). CUCUMBER-LEAVED SUNFLOWER. Hispid annual with sts. usually several together, 1-4 ft. high, the branches often mottled with purple and white: lvs. thin, glossy, ovate to triangular, 1-4 in. long, cordate, acuminate, entire or irregularly toothed: heads 2-3 in. wide,



on slender peduncles terminating the branches; involucre bracts narrowly lanceolate, tapering into a stout bristle, in about 3 series. July-Sept. Fla. to Tex. and westward.—In certain variants (as *H. purpureus*, Hort.) the color and form of the florets vary.

4. *H. orgyalis*, DC. Perennial 8-10 ft. high, the strict st. glabrous, very leafy to the top: lvs. linear or lanceolate to almost filiform, 8-16 in. long, slightly rough, drooping, the lower petiolate: heads numerous; involucre bracts lanceolate, acuminate-aristate; rays lemon-yellow; disk brown or purplish. Sept.-Oct. Neb. to Tex. and westward.

5. *H. scaberrimus*, Ell. (*H. rigidus*, Desf.). STIFF SUNFLOWER. Perennial 1-3 (rarely 5-8) ft. high, the st. strict, sparingly branched, rough or hairy: lvs. firm, thick, short-hispid, oblong-ovate lanceolate, 6-12 in. long, entire or slightly toothed: heads showy, 2½-4 in. wide, long-stalked; rays numerous, about 1½ in. long; disk sometimes yellow at first, turning brown. Aug.-Oct. Minn. to Ill., Ga. and Tex.—Varies under cult. chiefly in doubling (multiplication of rays) and in lengthening of blooming period.

6. *H. atrorubens*, L. (*H. sparsifolius*, Hort.). PURPLE-DISK SUNFLOWER. Rough-hairy perennial 2-5 ft. high, the smooth naked st. forking above: lvs. thin, ovate to oblong-lanceolate, 3-6 in. long, serrate, with margined petiole: heads about 2 in. across, corymbed; rays 10-16, rarely over 1 in. long; disk dark red. Autumn. Va. to Fla. west to O. and La.

7. *H. decapetalus*, L. WILD SUNFLOWER. Perennial, 2-5 ft. high, the st. branched above: lvs. thin, rough on both surfaces or finely pubescent beneath, ovate to ovate-lanceolate, 3-8 in. long, serrate, with narrowly margined petiole: heads numerous, 2-3 in. across; involucre bracts lanceolate; rays light yellow, about 10 or usually more. July-Sept. Que. to Ga. west to Mich. and Ky.—A cult. form (*H. multiflorus*, Hort.) has given rise to many cultivars differing mainly in extent of doubling, season of blooming, habit of plant and size of fls.

8. *H. giganteus*, L. INDIAN-POTATO. Stout perennial, 3-12 ft. high, the st. branched above: lvs. very rough, lanceolate, serrate to nearly entire, 3-7 in. long: heads usually several, somewhat corymbed, mostly long-peduncled, 1½-3 in. broad; involucre bracts lanceolate, acuminate, in 2-3 series; rays 10-20, barely 1 in. long, cupped, pale yellow; disk yellowish. Aug.-Oct. Ont. to Fla., west to Neb.—A northern form has very fleshy roots.

9. *H. Maximiliani*, Schrad. Resembles *H. giganteus*: st. usually 2-4 (sometimes 8-10) ft. high: lvs. inclined to be trough-shaped: heads short-peduncled; rays 15-30, deep yellow, commonly 1½ in. long. (Named after Maximilian Alexander Philip, Prince of Neuwied, who in the forepart of the 19th century traveled in Brazil and N. Amer. in the interests of natural science.) Aug.-Oct. West of Mississippi River.

10. *H. tuberosus*, L. GIRASOLE. Perennial cult. for the tubers produced on the ends and branches of underground sts. or rootstocks as well as midway on the rootstocks; st. erect, 5-10 ft. high, hirsute: lvs. opposite or the upper alternate, long-ovate to ovate-oblong (the upper narrower), serrate-dentate, rough above, with winged petiole: heads 2-3 in. across, few or many, terminating the branches; rays conspicuous, light yellow; disk yellow. Canada and U. S.—Cult. under the meaningless name "Jerusalem artichoke." In improved strains, the terminal tubers are club-shaped, 4 in. long, 2-3 in. diam. at the end, and weigh 3-4 ozs.; they constitute an excellent and neglected source of food.

11. *H. mollis*, Lam. Perennial, 2-5 ft. high, the stout leafy st. hoary-villous at least when young: lvs. ovate to lanceolate, 3-5 in. long, cordate, soft white-pubescent or the upper side scabrous: heads solitary or few, 2-3 in. broad; involucre bracts lanceolate, in 3-4 rows; rays 15-25; disk yellowish, hemispheric. O. to Ga. west to Ia. and Tex.

12. *H. lætiflorus*, Pers. SHOWY SUNFLOWER. Perennial, 4-8 ft. high, closely resembling *H. scaberrimus*; st. leafy and rough-hairy: lvs. ovate-lanceolate, more or less serrate, 4-10 in. long, rough on both sides: heads several, 2-4 in. broad, short-peduncled; rays 15-25, showy, about 1½ in. long; disk yellow. Ind., Ill., Wis.

24. *SPILANTHES*, Jacq. Usually spreading or creeping herbs, 30 or more species, widely distributed in both hemispheres.—Lvs. opposite, serrate: heads on peduncles terminating the st. and branches; rays yellow or whitish or none;

disk-fls. yellow. (*Spilanthes*: Greek for *spot-flower*, in reference to the markings on the disk in some species.)

**S. oleracea**, L. Sparsely pubescent, diffusely branched: lvs. petiolate, broadly ovate, repand-subdentate: heads discoid, solitary on peduncles terminating the st. and branches; involucre bracts in 2 series, equal; disk greenish-yellow, ovoid or conical, becoming nearly 1 in. long. Aug.-Oct. Tropics.—Rarely cult. for its pungent flavor in salads, also to a slight extent as an ornamental on account of its odd cylinder-like heads.

**25. ZINNIA**, L. Annual or perennial herbs or subshrubs of N. and S. Amer., chiefly Mex., cult. for their showy fls.; about 12 species.—Lvs. opposite, mostly sessile and entire: heads solitary, showy, terminating the branches, the bright-colored rays long-enduring; the disk in cult. forms nearly or wholly lacking: achenes flattened, wingless or nearly so, the pappus when present of erect awns or chaffy teeth. (*Zinnia*: Johann Gottfried Zinn, 1727-1759, professor of medicine at Göttingen.)

Rays oblong.

Fls. variously colored: lvs. clasping, cordate-ovate or elliptic.....1. *Z. elegans*

Fls. orange: lvs. sessile, oblong- to ovate-lanceolate.....2. *Z. Haageana*

Rays linear, red or purple.....3. *Z. multiflora*

1. ***Z. elegans***, Jacq. YOUTH-AND-OLD-AGE. Erect annual, commonly 1-2 ft. high (varying from  $\frac{1}{2}$ -3 ft.), the st. short-hairy: lvs. sessile, more or less clasping, ovate to elliptic, shortly rough-hispid: heads solitary, 2-4 $\frac{1}{2}$  in. across; involucre bracts rotund or elliptic, blunt, dark-tipped, imbricated in several rows; chaffy bracts of the receptacle toothed; rays broad and showy, becoming reflexed, originally purple or lilac, but now of nearly every color except blue and green; disk originally yellow or orange, but in common double forms nearly or quite absent: achenes flattened. Mex.

2. ***Z. Haageana***, Regel (*Z. mexicana*, Hort.). Plant usually smaller than *Z. elegans*: lvs. oblong- to ovate-lanceolate, sessile: heads orange, 1-1 $\frac{1}{2}$  in. across. (Bears the name of Herr Fr. A. Haage.) Mex.

3. ***Z. multiflora***, L. (*Z. tenuiflora*, Jacq.). Erect annual, branched above or subsimple: lvs. ovate and acute, or ovate-oblong and obtusish: peduncles (frequently short or none) often thickened upwards; rays red or purple, mostly narrow and suberect or scarcely spreading. Fla. to Tex. and south in S. Amer. to Bolivian Andes.

**26. SANVITALIA**, Lam. American annual herbs, about 7-8 species, chiefly from Ariz. to Cent. Amer.—Mostly low and branching: lvs. opposite, more or less petioled, commonly entire: heads rather small, solitary, terminating the branchlets; ray-fls. white or yellow; disk-fls. brown or purple: disk-achenes more or less compressed, the pappus of 1-2 awns or teeth or none; ray-achenes commonly 3-sided, 3-awned. (*Sanvitalia*: *Sanvitali*, name of a noble Italian family.)

**S. procumbens**, Lam. Hairy low-growing annual with trailing sts. branching and leafy: lvs. ovate,  $\frac{1}{2}$ -1 in. long, petiolate: heads solitary, about  $\frac{3}{4}$  in. across, closely subtended by a pair of leafy bracts; involucre bracts imbricated in about 3 rows, the outer foliaceous-tipped; rays yellow; disk-fls. dark purple: achenes 1-3-awned or those of the disk sometimes awnless. Summer to late autumn. Mex.

**27. HELIOPSIS**, Pers. Sunflower-like plants, about 7 species native to N. Amer., several cult. for their showy fls.—Perennial herbs or one annual; sts. loosely branched: lvs. opposite, petioled, 3-ribbed, oblong-ovate to ovate-lanceolate, coarsely toothed: heads pedunculate, showy; rays with large yellow oblong or linear-oblong ligules; disk-fls. partly inclosed in chaffy bracts of the receptacle: achenes without pappus or with a toothed border. (*Heliopsis*: Greek *like the sun*.)

Plant smooth and glabrous throughout or the lvs. roughish above....1. *H. helianthoides*

Plant rough throughout with hispid-scabrous hairs.....2. *H. scabra*

1. *H. helianthoides*, Sweet (*H. lævis*, Pers.). Coarse perennial 3-5 ft. high (dwarfed forms 2-3 ft.), smooth and glabrous throughout or nearly so: lvs. thinnish, oblong-ovate or ovate-lanceolate, 3-5 in. long, serrate, sometimes roughish above: heads numerous, somewhat corymbed,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. broad; rays broadly linear, 1 in. long: achenes smooth and glabrous, truncate or obscurely 2-4-toothed at summit. July-Oct. Ont. to Fla. west to Ill. and Ky.

2. *H. scabra*, Dunal. Differs from *H. helianthoides* chiefly in being rough throughout with hispid-scabrous hairs: upper lvs. sometimes entire: heads few, often solitary, in vars. pale yellow or golden-yellow: achenes pubescent on the angles when young; pappus a chaffy crown or sometimes of 2-3 teeth. July-Oct. Me. to N. J. west to Mo.

28. **BIDENS**, L. BUR-MARIGOLD. STICK-TIGHTS. TICKSEED. Weedy plants, perhaps 90 species widely distributed but mostly American, little known in cult.—Annual or perennial herbs: lvs. opposite, serrate or incised, or often pinnately or ternately divided: heads solitary, clustered, with or without rays; involucre bracts in 2 series, the outer green and more or less foliaceous, the inner thinner and differing in texture; rays yellow or white; disk yellow: achenes flat or angled; pappus of 2-4 stiff bristles or awns, usually retrorsely barbed. (Bi-dens: Latin *two teeth*, in reference to the pappus awns.)

*B. ferulæfolia*, DC. Glabrous annual with branching st.: lvs. bipinnately dissected into small narrow divisions: heads loosely corymbose, short-peduncled, not 1 in. across; rays and disk bright yellow: achenes linear, glabrous; pappus of 2 short awns with a few minute retrorse prickles. Mex.

29. **COSMOS**, Cav. Showy herbs, some cult. for ornament; perhaps 20 species, all trop. American, mostly Mexican.—Late-flowering annuals or perennials, often tall, usually glabrous: lvs. opposite, in ours pinnately cut: heads long-peduncled, solitary or in loose corymbose panicles; involucre bracts in 2 series, connate at base; receptacle chaffy; rays showy, variously colored: achenes glabrous, commonly beaked, the beak terminating in 2-4 awns. (Cos-mos: from a Greek word with a root idea of orderliness; hence an ornament or beautiful thing.)

Disk yellow: achenes distinctly beaked.

Rays white, pink or crimson.....1. *C. bipinnatus*

Rays yellow.....2. *C. sulphureus*

Disk red; rays dark-red: achenes not distinctly beaked.....3. *C. diversifolius*

1. *C. bipinnatus*, Cav. Glabrous or somewhat pubescent annual, 7-10 ft. high: lvs. bipinnately cut into remote linear entire lobes: involucre bracts ovate-lanceolate, unequal, the outer long-acuminate, herbaceous, the inner acute, scarious-margined, alternating with the outer; rays white, pink or crimson; disk yellow: achenes glabrous, with an abrupt beak much shorter than the body. Mex.

2. *C. sulphureus*, Cav. Pubescent annual, 4-7 ft. high, much-branched: lvs. often 1 ft. or more long, 2-3-pinnately cut into lanceolate mucronate lobes, shortly ciliate: heads 2-3 in. across, on long naked peduncles; outer involucre bracts 8, linear, acuminate, green,  $\frac{1}{4}$  in. long; inner involucre bracts oblong-lanceolate, scarious-margined, longer than the outer and alternating with them; rays 8, broadly obovate, strongly 3-toothed at apex, ribbed beneath, pale, pure or golden-yellow; disk fls. yellow, the anthers exserted, black with orange tips: achenes hispid,  $\frac{3}{4}$ -1 in. long including the slender beak. Mex.

3. *C. diversifolius*, Otto (*Bidens atrosanguinea*, Ortg. *Dahlia Zimapani*, Roezl). BLACK COSMOS. Perennial 12-16 in. high, treated as an annual, the tubers more slender than those of common dahlias: lvs. entire or pinnately parted into 5-7 entire or slightly serrate lfts., the terminal largest: peduncles each bearing a single head 6 in. or more above the foliage; rays dark velvety red, sometimes tinged dark purple (in one var. pale purplish), entire or toothed at apex; disk red: achenes 4-angled, not distinctly beaked. Mex.

30. **DAHLIA**, Cav. (*Georgina*, Willd.). Some dozen or 15 species are now known from the mts. of Mex. and Guatemala (ours Mexican), strong erect branching plants with tuberous roots, some well known for their large showy

heads.—Perennials, but sometimes blooming the first year from seed and treated as annuals although the resulting tubers may be carried over: lvs. opposite, 1-3-odd-pinnate, the pinnae or segms. usually variously ovate and toothed: heads long-peduncled, with yellow disk and red, purple, pink or white rays; disk-fls. bisexual and fertile; ray-fls. neutral or pistillate; involucre with double series of bracts, the inner thin and scale-like and slightly united at base, the outer smaller and somewhat leafy; receptacle flat or curved, chaffy: achenes oblong or obovate, compressed, the pappus lacking or of 2 obscure teeth. (Dahl-ia: Andreas Dahl, a Swedish botanist, pupil of Linnaeus; died 1789.)—The botany of Dahlia is not yet well understood, and the specific names are tentative. Descriptions of the original species were from domesticated and modified plants, and their application is open to doubt; and the native forms have not been sufficiently collected. The lower lvs. and roots, as well as the fls., are essential to a careful understanding of the species.

- The tree dahlias,—the plants tall and tree-form with one or more trunks, somewhat woody.  
 Heads bell-shaped from the position of the rays, nodding.....1. *D. imperialis*  
 Heads flat from the expanding rays, erect.....2. *D. excelsa*  
 The bush dahlias,—plants producing many sts., not woody, usually not more than 6 ft.  
 Foliage finely cut, from the fact that the pinnae are pinnatifid to the end into short broad segms.....3. *D. Merckii*  
 Foliage not appearing finely cut although more or less 2-pinnate, the pinnae in that case having long and pointed lobes or segms. only at the base.  
 Rays flat (at least in single or prominently rayed forms).  
 Lfts. rather bluntly or at least coarsely toothed.....4. *D. pinnata*  
 Lfts. sharp-serrate.....5. *D. coccinea*  
 Rays with margins strongly recurved.....6. *D. Juarezii*

1. *D. imperialis*, Roehl. Sts. few or several, 6-18 ft. tall and trunk-like, mostly not branched, angled: lvs. large, openly 3-pinnate like an aralia, finely pubescent; ultimate lfts. ovate, 1-2 in. long, sharp-pointed, sessile or short-stalked, incurved-serrate: heads standing high above the foliage, nodding, 4-7 in. across, white and more or less tinged red, the rays about 8, thin, long and narrow, prominently pointed and not toothed at apex.

2. *D. excelsa*, Benth. (*D. arborea*, Hort. *D. arborea*, Regel is a *nomen nudum*). Sts. usually several, to 20 ft. or more, mostly not branched, woody, glaucous: lvs. very large, often 2½ ft. long and nearly as broad, 2-pinnate; ultimate lfts. many, ovate, acuminate, more or less contracted at base, coarsely-few-toothed, nearly or quite glabrous: heads erect, 4-5 in. across; rays about 8, flat-expanding, purplish or crimson-pink; disk of the anemone type.

3. *D. Merckii*, Lehm. (*D. glabrata*, Lindl.). Diffuse slender wholly glabrous plant, 2-3 ft., with slender tubers: lvs. pinnate and the pinnae pinnatifid into decurrent segms. 1-2 in. long and nearly as broad, which are nearly blunt but apiculate and only few-toothed or obscurely serrate, making an attractive foliage plant: heads on long wiry sts., 1-2 in. across, the flat short rays nearly blunt and obscurely apiculate, lilac; involucre bracts linear. (Named in compliment to H. J. Merck, Senator in Hamburg.)

4. *D. pinnata*, Cav. Sts. glabrous or essentially so, branched, 4 ft.: lvs. 2-pinnate or the upper ones pinnate, the expanded petioles nearly connate, the ultimate pinnae ovate, crenate-dentate, very green above and grayish beneath, the rachis more or less winged: heads horizontal or somewhat nodding, 2-3 in. across but much larger in developed and double forms; rays 8, fertile, rose-colored (other colors now common), ovate, obscurely 3-toothed at apex; outer involucre bracts 6 or 7 and leafy.—The name *D. rosea* (1794 or 5) is sometimes used for the common hort. dahlias, now much doubled and modified; but *D. pinnata*, Cav., 1791, the type of the genus, undoubtedly must be employed; Cavanilles made both names and considered that he had two good species; and he says that in *D. pinnata* the lvs. are pinnate while in *D. rosea* they are bipinnate. It has been customary to use the name *D. variabilis* for this group; this name starts as *Georgina variabilis*, Willd., 1806, transferred to Dahlia by Desfontaines in 1829; Willdenow states that the lvs. are pinnate, although the lower pinnae of the radical lvs. are ternate; but these characters probably have minor significance in the old descriptions since



both lf.-forms may occur freely on the same plant. Further investigation with these plants in cult. and in the wild may make considerable change in diagnosis of the group; *D. pinnata* was based on cult. subjects, with many (double) rays.

5. *D. coccinea*, Cav. Very like No. 4 and perhaps not possible to distinguish in cult. plants: more slender; st. glaucous: lvs. 2-pinnate, the ultimate pinnæ narrower, ovate-acuminate and sharply serrate, the foliage not so heavy, rachis little or not at all winged: rays 8 (although originally figured with 9), usually not fertile, scarlet on upper surface and lighter-colored beneath; outer involucre bracts 5 and reflexed.

6. *D. Juarezii*, Hort. CACTUS DAHLIA. Like No. 4 in stature and growth: most or all of the many rays with recurved margins and mostly brilliant scarlet; rays irregular in length and overlapping, giving a characteristic appearance to the head. Probably a hybrid, the nearest ancestral form being the 8-rayed *D. Popenovii*, Safford, of Gautemala; the first stock is said to have come from Mex.; the specific name is in compliment to Benito Juarez, Mexican president and patriot.

31. **THELESERMA**, Less. Glabrous herbs or subshrubs of Mex. and extra-trop. S. Amer., one or two cult. for the fls.; about 7 species.—Lvs. opposite or the upper alternate, 1-2-pinnately parted into linear or filiform segms., or the uppermost simple and linear: heads medium-sized, solitary, on long peduncles; involucre bracts in 2 rows, the inner row campanulate and connate to the middle or higher; rays 8-10, neutral, yellow or brownish, in 1 row; disk-fls. purplish, fertile: achenes glabrous, smooth or tuberculate; pappus of 2 awns or scales. (*Thelesperma*: Greek *wart* and *seed*, the achenes often papillose.)

**T. hybridum**, Voss (*Cosmidium Burridgeanum*, Hort. Probably *Coreopsis atropurpurea* and *C. atrosanguinea*, Hort.). Branching annual 1½ ft. high: lvs. 1-2-pinnately divided into filiform lobes: heads 1¼-1½ in. across, on long slender peduncles: rays broad, brown-purple with yellow margin. Aug.-Sept. (Hybrid of *T. trifidum* and *Coreopsis tinctoria*, from the latter of which it acquires its brown-purple rays.)

32. **COREOPSIS**, L. (Incl. *Calliopsis*). TICKSEED. An attractive genus of about 70 species native to Amer., trop. Afr. and the Hawaiian Isls., a number cult. in the open garden for their showy fls. blooming in summer and autumn. —Annual or perennial herbs or seldom shrubs: lvs. commonly opposite, entire or variously lobed or dissected: heads usually showy, pedunculate, solitary or loosely paniced; involucre bracts in 2 distinct series of 8 each, the outer herbaceous and narrower than the inner, all commonly united at base; receptacle chaffy; rays about 8, rather broad, yellow, parti-colored or sometimes rose-color: achenes flat or becoming incurved, winged or wingless; pappus of 2-4 awns, scales or teeth, or entirely lacking. (*Coreopsis*: Greek, signifying *bug-like*, from the fr.)

- A. Disk-fls. dark purple or brown; rays lobed or toothed.
- B. Outer involucre bracts lanceolate or triangular, very short.
  - c. Achenes winged or scarious-margined.
    - d. Plant ½-2 ft. high..... 1. *C. cardaminefolia*
    - dd. Plant 2-4 ft. high..... 2. *C. Atkinsoniana*
  - cc. Achenes wingless..... 3. *C. tinctoria*
- BB. Outer involucre bracts narrowly linear, about equaling the inner.... 4. *C. Drummondii*
- AA. Disk-fls. yellow (sometimes turning brown).
- B. Rays rose-purple; peduncles not over 2 in. long..... 5. *C. rosea*
- BB. Rays yellow.
  - c. Peduncles 6 in. long or more; rays lobed or toothed.
    - d. Plants annual: rays with dark lines at base..... 6. *C. coronata*
    - dd. Plants perennial: rays wholly yellow.
  - E. St. leafy only toward base: lvs. mostly entire..... 7. *C. lanceolata*
  - EE. St. leafy throughout.
    - F. Lvs. of st. commonly lobed, the terminal lobe lanceolate, obtuse, three to five times as long as wide..... 8. *C. grandiflora*
    - FF. Lvs. of st. often entire, if lobed the terminal lobe elliptic tapering to both ends, acute, two to two and a half times as long as wide..... 9. *C. pubescens*

cc. Peduncles not over 2 in. long; rays mostly entire or slightly toothed at apex.

d. Lvs. 3-cleft to below middle, the lobes oblong-linear.....10. *C. palmata*

dd. Lvs. divided, appearing verticillate.

e. Divisions of lf. 3, lanceolate.....11. *C. major*

ee. Divisions of lf. commonly more numerous, narrowly linear.12. *C. verticillata*

1. *C. cardaminefolia*, Torr. & Gray. Annual,  $\frac{1}{2}$ –2 ft. high, glabrous or nearly so: lvs. all 1–2-pinnately divided, the lobes of the basal and lower lvs. ovate to elliptic or linear, those of the upper lvs. mostly linear: heads scattered-paniculate,  $\frac{3}{4}$ – $1\frac{1}{2}$  in. across; outer involucre bracts very short; rays rarely  $\frac{1}{2}$  in. long, brown-purple at base, 3–4-toothed or -lobed; disk dark purple: achenes winged, the pappus represented by 2 obscure teeth or lacking. S. U. S.

2. *C. Atkinsoniana*, Dougl. Perennial or annual, 2–4 ft. high, glabrous: lvs. 1–2-pinnately divided into linear lobes: heads  $\frac{3}{4}$ – $1\frac{1}{2}$  (rarely 2) in. across on slender elongated peduncles; outer involucre bracts much shorter than the inner; rays with brown-purple base and 3–4-toothed or -lobed apex; disk purple or brownish: achenes narrowly winged or merely scarious-margined, the pappus represented by a pair of short teeth. Autumn-flowering. (Named for Wm. Atkinson of Grove End, hort. architect.) W. U. S.

3. *C. tinctoria*, Nutt. (*C. bicolor*, Reichb. *C. elegans*, Hort. *Calliopsis marmorata*, Hort.). Glabrous annual 1–3 ft. high, branching above, rather strict: basal and lower cauline lvs. long-petioled, 2-pinnately divided into linear or lanceolate lobes, the upper sessile or wing-petioled and with linear lobes: heads  $\frac{3}{4}$ – $1\frac{1}{2}$  or 2 in. across, loosely paniced, on peduncles 2–4 in. long; outer involucre bracts much shorter than inner; rays  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, crimson-brown at base or sometimes throughout, the apex toothed or lobed; disk brownish-purple: achenes thinnish, somewhat incurved, wingless or barely margined; pappus none or an obscure border. July–Oct. Cent. U. S.

4. *C. Drummondii*, Torr. & Gray (*C. picta*, Hort.). GOLDEN WAVE. Annual 1–2 ft. high, pubescent or glabrous: lvs. pinnately divided, the lobes round-ovate to oblong or in the upper lvs. sometimes linear: heads 1–2 in. across, on long peduncles; outer involucre bracts nearly equaling the inner; rays broad, toothed or lobed at apex, brownish-purple only at base; disk dark purple: achenes much incurved, with a thick cartilaginous margin; pappus obscure or lacking. Aug.–Sept. (Named for Jas. L. Drummond, naturalist who traveled in N. Amer. and died in Cuba in 1835.) Tex.

5. *C. rosea*, Nutt. Nearly glabrous perennial,  $\frac{3}{4}$ –2 ft. high, leafy, from slender creeping rootstocks: lvs. entire, linear, or the lower 3-parted and the lobes linear: heads  $\frac{3}{4}$ –1 in. across, on short peduncles; outer involucre bracts much shorter than the inner; rays rose-color, coarsely 3-toothed or -lobed; disk yellow: achenes with callous margin; pappus an obscure entire border. June Sept. Mass. to Ga.

6. *C. coronata*, Hook. (*C. nuscensis*, Heller). Glabrous or sparsely hirsute-pubescent annual, loosely branched, 1–2 ft. high: lvs. entire and obovate or spatulate-oblong, 2–3 in. long, or the lower 3-parted into spatulate lobes, the lateral lobes small: heads  $1\frac{1}{2}$ –2 in. across, long-peduncled; outer involucre bracts equaling or shorter than the inner; rays bright yellow with a few dark lines above the orange-yellow base; disk yellow: achenes rather broadly winged; pappus of 2 minute teeth. Tex.

7. *C. lanceolata*, L. Glabrous or somewhat hirsute-pubescent perennial, 1–2 ft. high: lvs. usually in a few pairs or mostly in a tuft near the base, oblong-spatulate or lanceolate or nearly linear, obtuse, entire or rarely with 1–2 small lateral lobes: heads  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, on very long peduncles; outer involucre bracts commonly shorter than the inner; rays broad, often 1 in. long, 4–5-toothed, yellow throughout; disk yellow: achenes with thin scarious wings; pappus minute or obsolete. June–Sept. E. U. S.

8. *C. grandiflora*, Nutt. (Probably *C. floribunda*, Hort.). Usually somewhat hairy perennial, 1–2 ft. high, the st. branching and leafy: basal and some of the lower st.-lvs. lanceolate or spatulate, entire; upper or sometimes all the st.-lvs. 3–5-parted into lanceolate or linear obtuse lobes, the terminal lobes three to five times as long as wide: heads  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, very long-peduncled; outer involucre bracts nearly equaling the inner; rays yellow throughout, toothed at apex; disk yellow: achenes with broad thin-scarious wings; pappus a pair of small scales. June–Sept. S. U. S.—Probably not specifically distinct from *C. lanceolata* which under cult. gives rise to forms closely approaching *C. grandiflora*.

9. *C. pubescens*, Ell. (*C. auriculata*, Schkuhr, also Hort., not L.). Pubescent or nearly glabrous perennial, 1-4 ft. high, branched above, leafy throughout: lvs. thickish, very acute, petioled or nearly sessile, entire or with small acute lateral lobes, the terminal lobe elliptic tapering to both ends, two to two and a half times as long as wide; basal lvs. few: heads  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. broad; outer involucre bracts lanceolate, nearly as long as the inner; rays yellow throughout; disk yellow: achenes and pappus similar to those of *C. lanceolata*. July-Sept. S. U. S.

10. *C. palmata*, Nutt. (*C. præcox*, Fresen.). Stout glabrous rigid perennial,  $1\frac{1}{2}$ -3 ft. high, sparingly branched at summit: lvs. thick, cuneate,  $2\frac{1}{2}$  in. long, 3-cleft to below middle, the basal portion narrow, the broadly linear segms. often again irregularly divided: heads  $1\frac{1}{2}$   $2\frac{1}{2}$  in. broad; outer involucre bracts linear, about as long as the inner; rays pure yellow; disk yellow: achenes oblong, narrowly winged; pappus minute or obsolete. June-July. Cent. U. S.

11. *C. major*, Walt. (*C. senifolia*, Michx.). Pubescent or nearly glabrous perennial 2-3 ft. high, much-branched above: lower st.-lvs. small, the upper 2-3 in. long, entire and lanceolate or palmately divided into 3 equal lanceolate acute divisions: heads  $1\frac{1}{4}$ -2 in. broad; outer involucre bracts oblong-linear, equaling the inner; rays deep yellow; disk yellow: achenes obovate-elliptic, winged, 2-toothed at summit. Summer. S. E. U. S.

12. *C. verticillata*, L. Slender glabrous perennial 1-3 ft. high, sparingly branched: lvs. appearing verticillate, sessile, 2-3 in. long, ternately divided, the divisions dissected into linear or filiform segms.: heads 1-2 in. broad; outer involucre bracts about as long as inner; rays deep yellow; disk yellow: achenes oblong-obovate, narrowly winged; pappus nearly obsolete. July-Aug. E. U. S.

33. **LINOSYRIS**, Cass. Several species, native to the Old World, one often planted for ornament.—Erect perennial herbs: lvs. alternate, linear or oblong, subentire: heads discoid, solitary at the ends of the branches or corymbose; involucre of a few series of foliaceous bracts; fls. yellow, the corolla-limb deeply 5-fid. (Linosyris: *Linum* and *Osyris*, having the appearance of these genera.)

*L. vulgaris*, Cass. (*Aster Linosyris*, Bernh.). GOLDLOCKS. Glabrous perennial  $1\frac{1}{2}$ -2 ft. high: sts. strict, striate, from a hard rootstock: lvs. alternate, 1 in. long, linear, entire: heads numerous, corymbose, small, pale yellow, usually rayless; involucre imbricated, the many narrow bracts shorter than the florets and pappus: achene compressed, silky. Late summer or fall. Eu.

34. **CALLISTEPHUS**, Cass. A single species, native to Asia, yielding many races of well-known annuals for the flower-garden.—Erect stiffish herb with alternate lvs. coarsely toothed or incised: heads large, radiate, solitary at the ends of the branches; ray-corollas of various colors, often violet; involucre bracts in many series, the outer herbaceous, the inner membranaceous-scarious: pappus-bristles in 2 rows. (Callistephus: Greek for *beautiful crown*, said to be in allusion to character of achene.)

*C. chinensis*, Nees. CHINA ASTER. Erect, hispid-hairy, branching,  $\frac{1}{2}$ - $2\frac{1}{2}$  ft. high: lvs. broadly ovate or triangular-ovate, deeply and irregularly toothed, the blade decurrent into a petiole, the upper lvs. becoming spatulate and narrower: heads showy, terminal, in the wild plant with 1 2 series of pistillate ray-fls. and numerous tubular yellow disk-fls. which are bisexual and fertile; involucre hemispherical, the bracts in many series, the large outer ones green and often reflexed: achene compressed. Late summer and fall. China and Japan.—Under cult. the rays become greatly multiplied and show a wide range of variation in size, shape and color,—violet, purple, blue, rose, and white, never, however, a true yellow.

35. **BELLIS**, L. DAISY. Small plants, 10 species in Eu. and the Medit. region, one of them long cult.—Annual or perennial herbs, caespitose or with branching sts.: lvs. alternate or all basal, entire or sinuate, toothed: heads radiate, solitary, on naked peduncles; involucre bracts herbaceous; rays white or rose-color, the disk-fls. yellow: pappus mostly lacking. (Bellis: Latin *bellus*, pretty.)

*B. perennis*, L. TRUE OR ENGLISH DAISY. Perennial, 3-6 in. high: lvs. spatulate or obovate, forming a basal tuft: heads solitary, 1-2 in. across, on hairy peduncles;

rays white or rose, in vars. wholly or partly red and often incurved or reflexed or quilled. W. Eu.—Grown in flower-gardens and often escaping to lawns.

36. **FELICIA**, Cass. African subshrubs or rarely annual herbs, of about 50 species, one yielding a fine winter blue.—Low and branched from base: lvs. alternate or opposite, entire or dentate: heads radiate, usually long-peduncled; rays blue or white, the disk yellow: pappus-bristles in 1 series. (Felic-ia: for Herr Felix, a German official, died 1846.)

**F. amelloides**, Voss (*Agathæa cælestis*, Cass.). BLUE DAISY. BLUE MARGUERITE. Bushy subshrub 1-3 ft. high, sparsely hairy: lvs. opposite, elliptic or oblong-obovate, entire or nearly so, tapering to a short winged petiole: heads solitary, 1-1¼ in. across, on long naked peduncles; involucre bracts in 2 series, the outer with herbaceous tips; rays numerous, sky-blue; disk yellow. S. Afr.; grown under glass.

37. **BRACHYCOME**, Cass. About 50 species, mostly natives of Australia, one grown in the flower-garden.—Annual or perennial herbs with simple or branching sts.: lvs. basal or alternate, entire to pinnatifid: heads solitary and pedunculate or loosely corymbose at the ends of the branches; involucre broad, the bracts with dry scarious margin; rays in 1-2 series, white, blue, or lilac: pappus of bristles or scales or lacking. (Brachy-ome: Greek *short hair*, alluding to the pappus.)

**B. ibericifolia**, Benth. SWAN RIVER DAISY. Branching annual 6-16 in. high: lvs. alternate, small, pinnately divided into narrow segms.: heads 1 in. across, on slender peduncles, the rays blue, rose-color or white; involucre bracts subequal. Australia.

38. **BOLTONIA**, L'Her. FALSE CHAMOMILE. Tall perennial herbs, 4 or 5 species native to the U. S. and E. Asia, sometimes planted in borders and wild gardens, flowering in late summer and fall.—Glabrous, erect, leafy-stemmed, branching above: lvs. alternate, entire or minutely toothed, sessile and commonly becoming vertical by a twist at base, rarely decurrent: heads short-peduncled, rather showy, the numerous rays white, purplish or violet; involucre bracts imbricated. (Bolto-nia: James Bolton, English botanist, who wrote 1775-1795.)

Involucral bracts lanceolate, acute; heads ¾ in. across.....1. *B. asteroides*

Involucral bracts oblong to ovate, obtuse or mucronate; heads 1 in.

across.....2. *B. latisquama*

1. **B. asteroides**, L'Her. (*B. glastifolia*, L'Her.). Sts. 2-8 ft. high, simple below and branching above: lvs. broadly lanceolate or the upper narrower, minutely serrulate, sessile: heads radiate, ¾ in. across; involucre bracts lanceolate, acute; rays white to violet and purple: pappus-scales numerous, conspicuous, the 2 awns sometimes lacking. Sept. Pa. to Ill. and south.

2. **B. latisquama**, Gray. Heads larger, 1 in. or more across; involucre bracts oblong to ovate, obtuse or mucronate; rays blue-violet: pappus-scales small, the awns present and conspicuous. Kans. and Mo. to Ark.

39. **CHARIEIS**, Cass. One species, in the western Cape region of S. Afr., occasionally cult. in gardens.—Annual herb, diffuse or branched at base, hairy: lower lvs. opposite, the upper alternate, all entire or nearly so: heads radiate, solitary; involucre broad. (Chari-eis: Greek *elegant*, from the pleasing fls.)

**C. heterophylla**, Cass. (*C. Neesii*, Hort. *Kaulfussia amelloides*, Nees). Small branchy plant 6-12 in. high: lvs. oblong-spatulate or oblong-lanceolate: heads about ¾ in. across, long-pedunculate; involucre bracts in 1 series; rays pistillate, blue (violet or red-violet in vars.); disk yellow or blue.

40. **CALIMERIS**, Nees. Aster-like plants, about 10 species native to Asia, one cult. in the border.—Low perennial herbs differing from Aster in the hemispherical involucre of more nearly equal scarious-margined bracts in few



rows, and broad convex receptacle: achene flat and hairy. (Calim-eris: Greek *beautiful arrangement*.)

**C. incisa**, DC. (*C. incisæfolia*, Hort. *Aster incisus*, Fisch.). Erect, leafy-stemmed, 1–2 ft. high, corymbose at summit, finely appressed-hispid: lvs. oblong-lanceolate, remotely incise-dentate, those of the branchlets narrowly oblanceolate and entire or nearly so: heads radiate, solitary at the tips of the branchlets; involuclral bracts imbricated in 2–3 series, reddish-tipped, obtuse; rays purple or almost white; disk yellow. Siberia.

**41. ASTER**, L. **ASTER**. **STARWORT**. **MICHAELMAS DAISY**. A large temp. zone genus of more than 200 species particularly abundant in N. Amer., a number in cult. as border plants for autumn or summer bloom.—Leafy-stemmed herbs, mostly perennial and occasionally somewhat woody at base, very rarely annual: lvs. always alternate: heads usually clustered, sometimes solitary, seldom small; involuclral bracts commonly unequal and in part herbaceous, imbricated in several or few series, sometimes subequal and little imbricated; rays numerous, flattish, white, blue, red, or purple; disk-fls. yellow, in several species changing to purple or rose-color: achenes nerved, mostly compressed, the pappus usually simple and copious. (As-ter: Latin *star*.)—The following species have yielded the main cult. races; many of the wild species are transferred to borders on occasion, but are not ameliorated subjects.

Plants with sts. simple and scape-like, 1-headed.

Rays violet: basal lvs. spatulate; st.-lvs. linear-lanceolate.....1. *A. alpinus*

Rays pale blue: lvs. nearly oblong.....2. *A. subcæruleus*

Plants with sts. usually branched and several- to many-headed.

Margin of lvs. (at least the cauline) entire or nearly so (often serrate in *A. novi-belgii*).

Base of lvs. attenuate, not clasping.

Height of plant to 7 ft.....3. *A. tataricus*

Height of plant 2–3 ft.

Lvs. linear to lanceolate-linear.....4. *A. acris*

Lvs. oblong to oblong-lanceolate.....5. *A. Amellus*

Base of lvs. clasping.

Lvs. roughish-hairy: rays 40–60, deep purple.....6. *A. novæ-angliæ*

Lvs. smooth and glabrous: rays 15–25, blue-violet.....7. *A. novi-belgii*

Margin of lvs. commonly not entire.

Lvs. smooth and glabrous.....8. *A. lævis*

Lvs. more or less roughish-pubescent.....9. *A. trinervius*

1. **A. alpinus**, L. Appressed-pubescent perennial, the simple leafy sts. 6–10 in. high, several from base: lvs. entire, the basal and lower cauline spatulate or oblong-spatulate, tapering to a winged petiole, the upper cauline linear-lanceolate, sessile: heads solitary at the ends of the st.,  $1\frac{1}{2}$  in. across (3–4 in. in a var.); involuclral bracts nearly equal, in 2–3 series, the outer herbaceous, acutish, the inner herbaceous only at tips, acute; rays in 1–3 series, blue or violet (white in a var.), twice as long as the disk-fls.; disk-fls. yellow, becoming almost purple. May, June. Rocky Mts. and mts. of Eu.

2. **A. subcæruleus**, S. Moore. Erect perennial herb, somewhat hispid, the st. about 1 ft. high, from a tuft of oblong-spatulate entire or toothed lvs.; lateral branches very slender: st.-lvs. oblong to oblong-lanceolate, entire or nearly so, obtuse: heads terminating the main st.  $1\frac{1}{2}$ –2 in. across, those at the tips of the branches smaller; involuclral bracts oblong, acutish, nearly equal, in 2–3 series, mostly herbaceous; rays pale blue. June. N. W. India.

3. **A. tataricus**, L. f. St. erect and hispid, corymbose at summit, often 7 ft. high: lvs. large (the basal 2 ft. long), lanceolate or ovate-lanceolate, attenuate at base, entire: involuclral bracts purplish at tip; rays blue or purple. Fls. late. Siberia.

4. **A. acris**, L. Roughish-hispid perennial, slender-branched, 2–3 ft. high (a var. dwarf): lvs. linear or lanceolate-linear, entire,  $1\frac{1}{2}$  in. long: heads corymbosely clustered,  $1\frac{1}{4}$  in. across, the slender peduncles often bracteate; involuclral top-shaped, the bracts very unequal and imbricated in 4 rows; rays blue,  $\frac{1}{2}$ – $\frac{5}{8}$  in. long, spreading or somewhat reflexed. Sept. S. Eu.

5. **A. Amellus**, L. Roughish short-hispid perennial, the st. commonly corymbosely branched above, sometimes simple and 1-headed: lvs. oblong to oblong-

lanceolate, obtuse and apiculate or acute, entire or nearly so, narrowed to a sessile base: heads 1-1½ in. across; involucre bracts oblong, obtuse, unequal, imbricated, at least the outer herbaceous; rays broad, purple, ¾ in. long. Autumn. (Amellus: from the river Mella in Mantua where this plant occurs.) Eu. and Asia.—Variable, with several well-marked forms under hort. names.

6. *A. novæ-angliæ*, L. NEW ENGLAND ASTER. Perennial with st. stout and strict, 3-5 ft. high, branching above and very leafy to the top, coarsely hirsute or hispid with jointed hairs, also with glandular pubescence: lvs. lanceolate to broadly linear, entire, slightly if at all narrowed below, half-clasping by a strongly auriculate-cordate base, pubescent: heads crowded; involucre bracts linear-subulate, well-imbricated, the outer herbaceous and about equaling the inner; rays 40-60, deep purple, ½-¾ in. long. Autumn. E. N. Amer.

7. *A. novi-belgii*, L. NEW YORK ASTER. Rather low perennial, smooth and glabrous or the branches pubescent: lvs. oblong to linear-lanceolate, entire or serrate, the upper sessile and partly clasping: heads crowded, turbinate; involucre bracts linear, acute, imbricated, with herbaceous tips, the outer commonly shorter than the inner; rays 15-25, bright blue-violet, ½ in. long. Autumn. Me. to Ga.

8. *A. lævis*, L. (*A. decurrens*, Hort.). Stoutish perennial 2-3 ft. high, branching above, glabrous below the infl.: lvs. ovate or oblong to lanceolate, ciliate-serrulate and often toothed, the basal and lowest cauline 4-5 in. long, narrowed at base to a winged petiole, the upper with auriculate or subcordate and partly clasping base: heads about 1 in. wide, paniced, numerous, crowded, on rather stout leafy-bracteate peduncles; involucre bracts herbaceous-tipped, imbricated, the outer much shorter than the inner; rays 15-30, blue or violet. Aug., Sept. N. E. N. Amer.; source of cultivars; grown also in gardens in the tropics.

9. *A. trinervius*, Roxb. About 3 ft. high, stout, corymbose at summit: lvs. lance-ovate, 1-4 in. long, usually rough on both sides and strongly toothed: heads large, with narrow spreading blue or purple (a pale var.) rays. Himalayas.

42. **VITTADINIA**, A. Rich. Species about 7, native of Australia, New Zeal., S. Amer. and Hawaiian Isls., one known as a border plant in Calif.—Perennial herbs with thick seldom woody rootstocks, or branching subshrubs: lvs. alternate, entire, toothed, lobed or dissected: heads radiate, terminal, solitary or in loose corymbs; involucre bracts in several rows; rays pistillate, blue or white, numerous, crowded in more than 1 row; disk yellow: achenes compressed; pappus of numerous, often unequal capillary bristles. (Vittadinia: Dr. C. Vittadini, an Austrian, who wrote on fungi, 1826-1842.)

*V. australis*, A. Rich. (*V. triloba*, DC., not Hort.). Somewhat hairy, to 1 ft. high: lvs. obovate or oblanceolate to linear-cuneate, entire or coarsely 3-toothed or -lobed: heads solitary on slender peduncles; involucre bracts linear, subequal; rays narrow, revolute. Everblooming. Australia, Tasmania.

43. **ERIGERON**, L. FLEABANE. About 150 species scattered over the world, particularly in temp. and mountainous regions, a number cult. as border plants.—Annuals or perennials, acaulescent, or with erect loosely or corymbosely branched sts.: lvs. entire, toothed, or rarely dissected, those of the st. alternate: heads radiate (in ours), solitary or clustered; involucre campanulate or hemispheric, the bracts narrow, nearly equal, in 1-2 series; rays in 2 or more series, mostly rose, violet or purple, rarely cream-colored or white and in one species orange: pappus of soft bristles. (Erigeron: Greek *old man in spring*; some of the early kinds are somewhat hoary.)

Color of ray-fls. rosy-violet or purple.

Sts. commonly branching and several-headed: st.-lvs. lanceolate, acute or acuminate.

Rays ½ to almost 1 in. long: lvs. ciliate, otherwise nearly glabrous.....1. *E. speciosus*

Rays ¼-½ in. long: lvs. commonly rough-hairy.....2. *E. glabellus*

Sts. commonly simple and 1-headed: st.-lvs. spatulate or oblong, blunt.....3. *E. glaucus*

Color of ray-fls. not as above.

Fls. orange: sts. 1-2-headed.....4. *E. aurantiacus*

Fls. creamy or white.

St.-lvs. 1½ in. or more long, clasping.....5. *E. Coultteri*

St.-lvs. smaller, attenuate at base or petioled, not clasping....6. *E. Karvinskianus*

1. *E. speciosus*, DC. Erect perennial, 1½–2 ft. high, the st. more or less woody below, leafy, branching and sparsely hairy above: lvs. entire, short-ciliate, glabrous, those of the st. lanceolate, acuminate, somewhat clasping, the basal ones spatulate: heads 1–1½ in. across, borne at the tips of the corymbosely clustered branchlets; rays very numerous, dark violet, almost three times as long as the disk-fls. B. C. to Ore. near the coast.—The ray-fls. vary in size and color in vars.

2. *E. glabellus*, Nutt. More or less pubescent perennial, 6–20 in. high, the leafy sts. usually bearing several heads loosely clustered at the summit: upper lvs. lanceolate, becoming small and bract-like in the flowering branches; lower lvs. oblanceolate or spatulate: heads typically smaller than in *A. speciosus*; involucre bristly or pubescent; rays violet, purple or rarely white. Minn. to the Rockies.

3. *E. glaucus*, Ker. BEACH-ASTER. More or less pubescent perennial 9–12 in. high, the rather fleshy crown bearing a tuft of basal lvs. and several leafy simple 1-headed or occasionally branching sts.: lvs. commonly entire, slightly glaucous or ovate green in cult., spatulate or the upper oblong: heads 1¼–1½ in. across, the bright violet rays ½ in. long. Pacific Coast, where it fls. most of the year.

4. *E. aurantiacus*, Regel. DOUBLE ORANGE DAISY. More or less velvety; sts. leafy, 1–2-headed, 6–10 in. high, usually several from a tuft of basal lvs., these and the lower st.-lvs. spatulate-oblong or elliptic-oblong, more or less twisted; upper st.-lvs. ovate and sessile or clasping: involucre bracts loose, reflexed; rays orange-yellow, linear, in 5–6 rows. Turkestan.

5. *E. Coulteri*, Porter. Slender equally leafy perennial, 10–20 in. high: lvs. more or less pubescent, the lower obovate to oblong, entire or serrate; upper lvs. ovate to lanceolate: heads solitary (rarely 2 or 3), the 50–70 rays ½ in. or more long, white varying to purplish. (For Thos. Coulter, page 298.) Rocky Mts.

6. *E. Karvinskianus*, DC. (*E. mucronatus*, DC. *Vittadinia triloba*, Hort., not DC.). More-branched perennial, somewhat shrubby at base: lower st.-lvs. obovate-cuneate, ciliate at base, otherwise glabrous, rarely 3–5-toothed at apex, the teeth coarse, obtuse and mucronate; upper lvs. oblong, subentire: heads pedunculate, loosely corymbose; rays twice as long as the disk-fls., in 2 series, white with purple back. (Named for Baron v. Karwinski, a Bavarian, who traveled in Mex. and Brazil.) Mex.

44. **ARCTOTIS**, L. Herbs, of 30 or more species, mostly native to S. Afr., one common in flower-gardens.—Herbage more or less white-woolly: heads of large or medium size, long-peduncled, radiate; involucre bracts numerous, imbricated; receptacle honeycombed, mostly bristly: achenes grooved, mostly villous; pappus lacking, crown-like or composed of scales. (Arcto-tis: Greek for *bear's ear*, alluding to the pappus-scales.)

*A. stœchadifolia*, Berg. (*A. grandis*, Thunb.). Bushy annual, 2–2½ ft. high: lvs. repand-dentate: heads 2½–3 in. across, on peduncles far exceeding the lvs.; ray-fls. white or pale violet and white.

45. **VENIDIUM**, Less. S. African plants of 18 species, one more or less cult.—Annual or perennial herbs, more or less tomentose: heads solitary, radiate; involucre bracts in several rows, the outer narrower and herbaceous, the inner scarious; receptacle honeycombed, mostly naked: achenes glabrous, dorsally 3–5-winged or -ridged, the lateral ridges inflexed, the median straight, narrower; pappus lacking or of 4 minute scales. (Venid-ium: name of obscure application.)

*V. decurrens*, Less. (*V. calendulaceum*, Less.). Diffuse tomentose perennial (or a var. annual), the sts. 1–2 ft. long: lvs. mostly lyrate, white-tomentose, later becoming glabrate above, the terminal lobe ovate or roundish, sinuate-lobed or repand; petiole eared at base or the ears minute, or lacking in a var. which is cult. for its dark-centered sunflower-like golden-yellow heads 1–2½ in. across.

46. **GAZANIA**, Gaertn. (*Meridiana*, Hill). About 24 herbaceous species native to S. Afr., one long in cult. and still grown in warm sunny climates.—Perennial or rarely annual, with short leafy sts. or with lvs. crowded in a basal tuft: lvs. entire or pinnatifid: heads radiate, medium-sized to large, solitary on long peduncles; involucre bracts in 2 to several rows, united and cup-like

at base; rays ranging widely in color,—white, yellow, orange, scarlet, closing at night: achenes villous; pappus of 2 series of delicate scarious toothed scales, often hidden in the wool of the achene. (Gazania: after Theodore of Gaza, 1393–1478, translator of Aristotle and Theophrastus; or by some considered to be derived from Greek *riches*, owing to the floral coloring.)

**G. rigens**, R. Br. Sts. short and densely leafy or diffuse and laxly leafy, with ascending branches: lvs. densely white-tomentose below, green and glabrous above, simple, long-spatulate, tapering to a long winged petiole, or some with 1–2 large lateral lobes: heads large and showy,  $1\frac{1}{2}$  in. wide, the rays orange with a black white-eyed spot at base or the basal markings containing brown.—Blooming throughout the year in warm climates.

**47. URSINIA**, Gaertn. Species about 60, native to S. Afr., not much seen in cult.—Glabrous or pubescent annual or perennial herbs or subshrubs, strongly scented: lvs. alternate, mostly pinnatisect: heads radiate, solitary or loosely clustered; involucre bracts in many series; disk-fls. more or less inclosed in the bracts of the receptacle: achenes 10-ribbed; pappus of 5–6 scales and with or without bristles. (Ursinia: Johann Ursinus of Regensburg, 1608–1666, author of “Arboretum Biblicum.”)

**U. pulchra**, N. E. Br. (*Sphenogyne speciosa*, Knowles & Westc.). Leafy-stemmed branching annual, 1–2 ft. high: lvs. bipinnately dissected into linear lobes: heads yellow or orange, 2 in. across, solitary on rather long peduncles terminating the branchlets; involucre 4-rowed, the outer rows with a brown scarious border, the inner longer and with a white scarious border; rays about 22, 3-toothed, spotted purple-brown at base. Cape region of S. Afr.

**48. TAGETES**, L. Strongly scented herbs of about 20 species from New Mex. and Ariz. to Argentina, a few popular as flower-garden plants.—Mostly annual, branching, erect or diffuse, glabrous, with oil-glands on lvs. and involucre: lvs. usually opposite, pinnately dissected or rarely only serrulate: heads radiate, solitary or clustered, small to large; involucre bracts in 1 series, united nearly throughout into a long tube or cup: achenes with pappus of 3–6 unequal scales or bristles. (Tagetes: Tages, an Etruscan god, or perhaps of other derivation.)

Lvs. simple: heads clustered; rays 2–3.....1. *T. lucida*

Lvs. compound: heads solitary.

Rays few, usually about 5; heads about 1 in. across; fls. not marked with red.....2. *T. signata*

Rays numerous; heads larger.

Fls. usually marked with red; heads about  $1\frac{1}{2}$  in. across.....3. *T. patula*

Fls. not marked with red; heads 2–4 in. across.....4. *T. erecta*

1. **T. lucida**, Cav. SWEET-SCENTED MARIGOLD. Perennial (cult. as an annual), 1– $1\frac{1}{2}$  ft. high, commonly branching: lvs. opposite, sessile, oblong-lanceolate or oblanceolate, sharply serrulate, glandular-punctate: heads  $\frac{1}{2}$  in. across, 2–3-rayed, golden or orange-yellow, in a dense terminal cluster; involucre narrow-cylindric, glandular-punctate, the short teeth often sharply pointed: achenes with 2 or 3 blunt scales and 2 longer awn-like ones. Mex.

2. **T. signata**, Bartl. Branching annual, 1–2 ft. high: lvs. pinnately divided into about 12 linear or oblong sharply serrate segms., each segm. with 2 rows of large glandular dots: heads about  $1\frac{1}{4}$  in. across (smaller in a var.), yellow, the rays rather few; involucre oblong-cylindric with acutish teeth and large glandular-dots: pappus of several scales, 1 or 2 sharp-pointed or awned. Mex.

3. **T. patula**, L. FRENCH MARIGOLD. Bushy annual, branched from near base, 1– $1\frac{1}{2}$  ft. high: lvs. pinnately divided into about 12 lanceolate or oblong serrate segms., these or their teeth tipped with a long weak awn, each tooth usually with a large gland at base: heads about  $1\frac{1}{2}$  in. across, long-pedunculate, the thick oblong involucre with acute teeth, glandular-dotted; rays numerous, yellow with red markings: pappus of 1–2 long awned scales and 2–3 shorter blunt ones. Mex.; modified by cult.

4. **T. erecta**, L. AFRICAN MARIGOLD. Stout erect branching annual about 2 ft. high: lvs. pinnately divided into oblong or lanceolate serrate segms., all with a few



large glands near the margin and some (or their teeth) tipped with a long weak awn: heads yellow to orange, 2-4 in. across, the many rays long-clawed, in vars. 2-lipped or quilled, the stout peduncle swollen just below the head; involucre campanulate, the teeth elongate and often dentate: pappus with 1 or 2 long awned scales and 2 or 3 shorter blunt ones. Mex.

49. **ACTINOLEPIS**, DC. Mostly Californian, about 6-8 species, one an everlasting used for edging.—Slender branching annual herbs: lvs. opposite or the upper alternate: fls. yellow, in pedunculate heads at the ends of the branches; rays usually 2-3-toothed, in 1 series: pappus of scales or rarely lacking. (*Actinol-epis*: Greek a *scale-like ray*.)

**A. coronaria**, Gray (*Shortia californica*, Hort. *Bæria coronaria*, Gray). Diffusely branching annual, minutely glandular-pubescent, the weak sts. 6-10 in. long: lvs. 2 in. or more long, pinnately or the lower bipinnately parted into narrowly linear divisions: heads about  $\frac{1}{2}$  in. across: pappus-paleæ with or without awns or wanting. Calif.

50. **POLYPTERIS**, Nutt. Four native species, one sometimes cult.—Erect, branching, herbaceous, or sometimes woody at base, often glandular: lvs. mostly entire and alternate: heads radiate, slender-pedunculate, in loose panicles, the fls. rose-purple or flesh-colored; involucre broadly bell-shaped or top-shaped, the bracts in 1-2 series, often more or less colored and petal-like toward the tips: pappus of 6-12 equal scales. (*Polyp-teris*: Greek *many-winged* or *feathered*, referring to the pappus.)

**P. Hookeriana**, Gray (*Palafoxia Hookeriana*, Torr. & Gray). Annual, 1-4 ft. high, glandular and somewhat sticky above: lvs. lanceolate, mostly 3-nerved below: heads 1 in. or more across; rays 8-10, deeply 3-cleft, rose-red, about  $\frac{1}{2}$  in. long and showy. (Sir W. J. Hooker, page 316.) Sandy plains, Neb. to Tex.

51. **HELENIUM**, L. SNEEZEWEED. Coarse erect annual or perennial herbs of about 30 species, N. Amer., Mex.; two or three good hort. subjects.—Lvs. alternate, often decurrent on the st., entire or toothed, punctate with dark dots: heads mostly radiate, solitary or corymbose, yellow or brownish; involucre bracts spreading or soon reflexed, mostly herbaceous; receptacle convex to oblong, naked; rays wedge-shaped, 3-5-lobed, commonly drooping: pappus of usually 5-6 thin scales. (*Hele-nium*: possibly from Helenus, the son of Priam.)

Lvs. not decurrent on the st. and branches: sts. tomentose when young... 1. *H. Hoopesii*  
Lvs. decurrent on the st. and branches: sts. not tomentose.

Disk brownish or purplish, globose: upper lvs. entire..... 2. *H. nudiflorum*  
Disk yellow or reddish, subglobose or hemispheric: lvs. mostly serrate  
or dentate..... 3. *H. autumnale*

1. **H. Hoopesii**, Gray (*Dugaldia Hoopesii*, Rydb.). Stout perennial 1-3 ft. high; st. tomentose when young, becoming glabrate, leafy, bearing 1 to several large long-pedunculate heads: lvs. entire, oblong-lanceolate, or the lower spatulate, not decurrent at base: heads yellow, commonly 3 in. wide, the rays but slightly drooping. (First collected by Thos. Hoopes.) Rocky Mts.

2. **H. nudiflorum**, Nutt. Perennial 1-3 ft. high; st. roughish, leafy: lvs. narrowly lanceolate to oblong, entire, or the basal spatulate and toothed: heads 1-1½ (in one var. 2 or more) in. across, corymbose, short-peduncled, the drooping wedge-shaped rays yellow, brown-purple or striped with both colors; disk globose, brownish or purplish. N. C. to Fla. west to Ill. and Tex.

3. **H. autumnale**, L. (*H. grandiflorum*, Nutt.). SNEEZEWEED. Leafy-stemmed nearly glabrous perennial 2-6 ft. high: lvs. lanceolate to ovate-oblong, decurrent at base, mostly toothed: heads 1-1½ in. across, solitary or corymbose at the ends of the st. and branches; rays drooping, 3-cleft, yellow; disk hemispheric or subglobose, yellow. Que. to Fla. west to Man., Kans. and Ariz.—Some vars. have the fls. of the disk or of both disk and ray crimson or maroon.

52. **GAILLARDIA**, Foug. Twelve American species, mostly from the far West, several cult. in borders and flower-gardens.—Annual or perennial herbs

with st. leafy, erect and branching or reduced to a short caudex: lvs. alternate or basal, more or less toothed, punctate-dotted: heads radiate, showy, solitary on long peduncles; rays yellow or yellow and red, neutral, 3-toothed or -cleft giving the head a fringed appearance; disk-fls. purple, fertile; involucre broad, the bracts in 2-3 series: achenes densely villous or with villous hairs only at base; pappus of 5-10 mostly awned scales. (Gaillardia: named for M. Gaillard, a patron of botany in France.)

Plant annual: fls. normally mostly red.

Lobes of disk-fls. obtuse: lvs. sessile and auriculate.....1. *G. amblyodon*

Lobes of disk-fls. acute or awned: lvs. nearly sessile.....2. *G. pulchella*

Plant perennial: fls. normally yellow.....3. *G. aristata*

1. *G. amblyodon*, Gay. Annual 1-2 ft. high, leafy to the top, mostly hirsute: lvs. oblong (or the lower spatulate), auriculate and sessile, entire or nearly so: rays numerous, brown-red throughout; lobes (or teeth) of the disk-corollas short and obtuse: achenes with villous hairs only at base; ray-pappus awnless. Tex.

2. *G. pulchella*, Foug. Erect branching annual 12-20 in. high, soft-pubescent: lvs. oblong, lanceolate or spatulate, nearly sessile, entire or the lower lyrate-pinnatifid: heads 2 in. across; rays flat, yellow at tip and rose-purple at base (varying in size, shape and color in vars.); lobes of the disk-fls. acute or awned. Ark. and La. to Ariz.—Var. *picta*, Gray, is the usual cult. form, with large heads in different shades.

3. *G. aristata*, Pursh (*G. grandiflora*, *lutea*, *maxima* and *perennis*, Hort.). Erect perennial 2-3 ft. high, more or less hirsute: lvs. lanceolate or oblong, or lower spatulate, entire to sinuate-pinnatifid: heads 3-4 in. across, the flat rays yellow (or in cult. varying to red); lobes of disk-corollas acute to awned. Plains west.

53. **DIMORPHOTHECA**, Moench. CAPE MARIGOLD. About 20 species of annual or perennial herbs or subshrubs in S. Afr., two cult. for their showy fls.—Lvs. alternate or radical, entire, toothed or incised: heads (in ours) 1½-3 in. across, solitary, on terminal peduncles; ray-fls. long-ligulate, white, purple, yellow or orange; disk-fls. yellow or orange, the outer or seldom all fertile: achenes of the ray-fls. 3-angled, mostly wrinkled or toothed, those of the fertile disk-fls. compressed and with thickened or winged borders. (Dimorphothea: Greek *two-formed achenes*.)—The cult. forms do not yield readily to botanical determination.

Rays white above, purple or discolored beneath: sts. and lvs. more or less glandular.....1. *D. annua*

Rays orange-yellow (in vars. variously colored): sts. and lvs. glabrous or pubescent or scabrid.....2. *D. aurantiaca*

1. *D. annua*, Less. (*Calendula pluvialis*, L.). Erect or diffuse, simple or branched annual, more or less scabrid and roughened with jointed hairs: lvs. narrowly oblong to obovate-oblong, tapering to a sessile base, saliently few-toothed to subentire: heads nodding in fr.; involucre bracts linear-acuminate, exceeding the disk; rays white or yellowish above, purple or discolored below, or in a double-fl'd. var. yellow or violet below.

2. *D. aurantiaca*, DC. (*Calendula Tragus*, Curtis). Erect, glabrous or pubescent perennial blooming as an annual, natively becoming more or less shrubby: lvs. linear-oblong, tapering toward base, entire or few-toothed: heads with long bright or orange-yellow rays or these in vars. ranging from white or bluish-white to red, yellow, orange or salmon.—The garden forms of *Dimorphothea* are apparently derived from *D. aurantiaca*, either as mutants or as hybrids possibly resulting from a cross with *D. annua*.

54. **CALENDULA**, L. Species about 15, from Canary Isls. to Persia; yields an old herb grown in several races for ornament.—Annual or perennial herbs with simple alternate lvs. and mostly large heads with yellow or orange rays: involucre broad, the usually scarious-margined bracts in 1 or 2 rows; receptacle naked, plane: ray-achenes glabrous, incurved; disk-fls. infertile; pappus none. (Calendula: Latin *calendæ* or *calends*, throughout the months.)

*C. officinalis*, L. POT MARIGOLD. More or less hairy annual 1-2 ft. high: lvs. thickish, oblong to oblong-obovate, entire or minutely and remotely denticulate,

more or less clasping: heads solitary, on stout stalks, showy,  $1\frac{1}{2}$ –2 in. across, the flat spreading rays white-yellow to deep orange, closing at night, blooming the whole season; sometimes the plant is proliferous from the involucre, bearing several peduncled heads in a circle. S. Eu.—A common flower-garden annual; it is also now grown under glass for winter bloom, the heads reaching 4 in. across on disbudded plants. The heads are said to have been used sometimes for flavoring in cookery.

55. **GAMOLEPIS**, Less. Herbs or mostly small shrubs, of about a dozen species native to S. Afr., one cult. for edgings and for fls.—Lvs. alternate and mostly pinnatisect: heads solitary, pedunculate; ray-fls. bisexual, yellow: achenes without pappus, wingless and glabrous. (Gamol-epis: Greek *united scales*, referring to the involucre.)

**G. Tagetes**, DC. (*G. annua*, Less.). Glabrous wiry annual 1 ft. or less high, much-branched and very floriferous: lvs. pinnately parted into linear segms., these often saliently toothed or pinnatifid: heads bright yellow or orange,  $\frac{3}{4}$  in. across; involucre nearly or quite urn-shaped, the single row of bracts united for more than half their length.

56. **OTHONNA**, L. Species about 80, native to S. Afr., one sometimes grown in hanging baskets and on greenhouse benches.—Shrubs or herbs, the latter often with thickened roots: lvs. often fleshy, basal or cauline, the st.-lvs. alternate or clustered at the ends of the branches: heads solitary or clustered, commonly yellow; involucre bracts in 1 series, more or less united at base; rays fertile; disk-fls. sterile, tubular: pappus consisting of bristles. (Othon-na: ancient Greek name of no particular application here.)

**O. crassifolia**, Harv., not L. nor Mey. (*O. capensis*, Bailey). Nearly glabrous perennial with slender trailing or drooping sts., becoming shrubby at base: lvs. scattered or in clusters, fleshy and cylindric-obovoid, sharp-pointed, 1 in. or less long, woolly at base: heads nearly or quite  $\frac{1}{2}$  in. across, on slender ascending peduncles 2–6 in. long; rays bright yellow, narrow, wide-spreading.—Blooming in nearly all seasons, the fls. opening only in sun.

57. **DORONICUM**, L. LEOPARDS BANE. Perennial herbs; 20–30 species, native to Eu. and temp. Asia, several cult. for their fls.—Sts. simple or somewhat branched: basal lvs. long-petioled; st.-lvs. alternate, often clasping: heads yellow, long-peduncled, 1 to several at the end of st.; involucre bracts in 2–3 series. (Doron-icum: Latinized Arabic name.)—They are border plants, and the names apparently not well understood by cultivators.

Basal lvs. not cordate at base, ovate.

St.-lvs. sessile or petioled, nearly entire.....1. *D. plantagineum*

St.-lvs. half-clasping, toothed.....2. *D. Clusii*

Basal lvs. cordate at base.

St. 1-headed.....3. *D. caucasicum*

St. commonly several-headed.....4. *D. austriacum*

1. **D. plantagineum**, L. (*D. excelsum*, Hort.). Simple or somewhat branching perennial about 2 ft. (a var. 5 ft.) high; rhizome tuberous, roundish or creeping obliquely; st. stout, pubescent and glandular above: basal lvs. ovate or oblong-ovate, wavy-margined, long-petioled; lower st.-lvs. entire or toothed, ovate, abruptly narrowed into a broad-winged clasping petiole; upper st.-lvs. sessile, oblong or oblong-ovate, more or less toothed: heads  $1\frac{1}{2}$ –2  $\frac{1}{4}$  (in one var. sometimes 4) in. across, solitary on peduncles terminating the st. and branches; involucre of numerous linear-lanceolate bracts, two-thirds as long as the ray-fls.; rays yellowish, linear, very numerous. Eu.

2. **D. Clusii**, Tausch (*Arnica Clusii*, All.). About 2 ft. high: lvs. ovate or oblong; st.-lvs. half-clasping, with distant teeth or many small ones; a subvar. has long silky hairs on its lvs., another has none. (Named for Chas. de l'Ecluse, 1526–1609, noted botanist, professor at Leyden.) Swiss and Austrian Alps.

3. **D. caucasicum**, Bieb. Somewhat pubescent perennial with simple 1-headed st. from a stout horizontal rootstock: lvs. coarsely dentate, the basal subrotund, deeply cordate, petiolate; lower st.-lvs. petiolate, subcordate; upper st.-lvs. ovate, cordate-clasping, those near the head linear-lanceolate: heads as in *D. plantagineum*. Caucasus, Sicily, etc.

4. *D. austriacum*, Jacq. Hairy perennial with stout rootstock; st. somewhat branched, 2 ft. high or more: lvs. dentate, the basal petioled, ovate-rhombic, cordate at base; lower st.-lvs. ovate, cordate, the petiole with a broad wing which is cordate-clasping at base; upper st.-lvs. sessile, cordate-clasping at base: heads smaller than in *D. plantagineum*, the long peduncles terminal or in the upper axils. Eu.

58. *EMILIA*, Cass. Slender plants, about a dozen species, in warm parts of Afr., Asia to China, Polynesia and Amer., one species cult. for its fls.—Annual or perennial herbs with alternate lvs.: heads rayless, rather small, solitary or clustered; involucre very simple, cup-shaped, with no small outer bracts; florets all bisexual: achenes with 5 acute ciliate angles. (*Emil-ia*: perhaps a personal name.)

*E. flammea*, Cass. (*Cacalia coccinea*, Sims. *C. sonchifolia*, Hort., not L.). TASSEL-FLOWER. FLORAS PAINTBRUSH. Erect annual 1-2 ft. high, glabrous or sparsely hairy: basal lvs. and lowest st.-lvs. narrowly wing-petioled, rotund or elliptic; middle st.-lvs. oblong or elliptic, broadly wing-petioled or narrowed below to a sessile auriculate-clasping base; upper st.-lvs. oblong-lanceolate or ovate-lanceolate, acute or acuminate, with broad sagittate-clasping base: heads rayless, loosely corymbed, about  $\frac{1}{2}$  in. across; involucre bracts in 1 series, much shorter than the scarlet fls. Blooms from June till frost. Probably tropics of New World.—Fls. in one form golden-yellow.

59. *LIGULARIA*, Cass. Perennial herbs from W. Eu. to Siberia, Himalayas and China-Japan, about 30 species, grown in the open or indoors.—Lvs. alternate or sometimes all basal, mostly long-petioled, broad or orbicular or reniform, sometimes palmate, those of the st. smaller and bearing large sheaths: heads large, reflexed or nodding, in corymbs or racemes; involucre bracts in 1 series at the insertion, but of two forms, so that the narrow outer ones overlap the edges of the broader inner ones; rays mostly long and narrow, usually yellow: achenes glabrous, bearing soft pappus. (*Ligula-ria*: name refers to the strap-shaped or more or less bilabiate fls.)

- |  |                         |
|--|-------------------------|
| Lvs. deeply palmately cut.....   | 1. <i>L. japonica</i>   |
| Lvs. simple.   |                         |
| Margin of lvs. sharply toothed.  |                         |
| Fl.-st. branched: rays orange-yellow.....                                | 2. <i>L. clivorum</i>   |
| Fl.-st. simple: rays yellow.....   | 3. <i>L. Veitchiana</i> |
| Margin of lvs. repand-angulate: fl.-st. branched: rays light yellow..... | 4. <i>L. Kämpferi</i>   |

1. *L. japonica*, Less. (*Senecio japonicus*, Schultz). Perennial herb, 5 ft. high or reaching 15 ft. in the wild, grown for its massive foliage effect: basal lvs. 1 ft. or more across, deeply palmately cut into 7-11 narrow-lobed and notched divisions: fl.-sts. branched, bearing heads on rather long naked stalks; rays orange, spreading, 3 in. from tip to tip. Japan.

2. *L. clivorum*, Maxim. (*Senecio clivorum*, Maxim.). Robust perennial herb 4 ft. high, at first tawny-pubescent, glabrate: basal lvs. long-petiolate, reniform or subrotund, sometimes 20 in. diam., sharply mucronate-dentate: heads large, many-fld., with orange-yellow rays; disk-fls. dark brown. (*Clivorum*: of the hills.) Japan and China.

3. *L. Veitchiana*, Greenm. (*Senecio Veitchianus*, Hemsl.). Very stout perennial herb with simple fl.-st. 3-6 ft. high: basal lvs. 15-16 in. long, 10-11 in. broad, sharply dentate: heads very numerous, about  $2\frac{1}{2}$  in. diam.; rays 10-12, yellow. (*Veitchiana*: for the firm of Veitch, page 103.) China.

4. *L. Kämpferi*, Sieb. & Zucc. (*L. Farfugium*, Koch. *Farfugium Kämpferi*, Benth. *Senecio Kämpferi*, DC.). Rhizomatous perennial sending up many lvs. on slender flocculent-woolly petioles: lvs. often 6-10 in. across, orbicular to nearly reniform, cordate at base, angular-toothed, green: fl.-sts. 1-2 ft. tall, flocculent-woolly, branched, with only small bract-like lvs.: heads large, with light yellow rays spreading  $1\frac{1}{2}$ -2 in. across: pappus white and copious. (Engelbert Kämpfer, page 83.) Japan.—A var. known as "Leopard Plant" is commonly cult. for its lvs. which are blotched with yellow or white or sometimes with light rose, seen in window-gardens.

60. *GYNURA*, Cass. (*Crassocephalum*, Moench). About 24 species in the warmer parts of Asia and Afr., grown under glass as foliage plants.—Herbs or



rarely subshrubs: lvs. alternate, entire or lobed, numerous: heads discoid, not very showy; involucre cylindric or bell-shaped, of numerous bracts in 1 series with several very narrow spreading accessory bracts at base: achenes 5-10-striate, with copious slender white pappus-bristles. (Gynu-ra: name referring to the tailed stigmas.)

**G. aurantiaca**, DC. VELVET-TREE. Stout and branching, 2-3 ft. high; sts. almost succulent, densely pubescent with violet or purple hairs: lvs. large and soft, ovate, jagged-toothed, hairy, with short often narrowly winged petioles, the wings with few remote salient teeth; uppermost lvs. sessile, clasping: heads in loose terminal clusters, yellow or orange. Java.

**61. PETASITES**, Gaertn. BUTTER-BUR. Plants with large lvs. and fls. on separate radical sts. usually in advance of foliage; about 14 species of the north temp. zone especially in the Old World.—Coarse perennial herbs with thickish and mostly creeping rootstocks: lvs. large, basal, on strong petioles, orbicular or reniform, always with deeply cordate base: fl.-sts. leafy-bracteate, simple: heads nearly or quite dioecious, purplish or whitish, rayless or with short and mostly not showy rays, borne in corymbs or racemes; involucre bracts in 1 row, often with a few scale-like bracts outside. (Petasi-tes: Greek a broad-brimmed hat, referring to the broad lvs.)

**P. fragrans**, Presl. WINTER-HELIOTROPE. SWEET COLTSFOOT. About 8 in. high: lvs. orbicular, margined with small cartilaginous teeth, glabrous above, pubescent and green below, appearing during or after anthesis, evergreen: heads consisting of small fragrant fls. varying from pale lilac to purple, the marginal fls. of the pistillate heads in form of short rays. Spring. Medit. region.

**62. SENECIO**, L. GROUNDSEL. One of the largest genera of plants, about 1,200 species, in all parts of the world, a number cult. for their fls. or foliage, or for their climbing habit.—Herbs, shrubs or even trees, with alternate lvs. or sometimes the lvs. all basal: heads solitary or clustered, variously colored, usually radiate, the rays fertile; disk-fls. tubular, 5-toothed; involucre bracts in 1 series usually reinforced at base by shorter bracts or bracteoles having a calyx-like appearance: achenes mostly terete and ribbed; pappus of soft whitish often copious bristles. (Sene-cio: Latin name for plants of this genus, ultimately from *senex*, "old man," said to be in allusion to the hoary pappus.)

- A. Habit climbing.
  - B. Heads rayless. .... 1. *S. mikanoides*
  - BB. Heads radiate. .... 2. *S. scandens*
- AA. Habit not climbing.
  - B. St. herbaceous.
    - c. Plant white-woolly, perennial.
      - D. Lvs. pinnately-veined, some or all of them divided. .... 3. *S. Cineraria*
      - DD. Lvs. palmately-veined, angled or sinuate-toothed. .... 4. *S. cruentus*
    - CC. Plant not white-woolly (*S. pulcher* white-cobwebby).
      - D. Rays purple.
        - E. Lvs. 1-3 in. long, deeply pinnatifid: annual. .... 5. *S. elegans*
        - EE. Lvs. 4-10 in. long, lobate-dentate: perennial. .... 6. *S. pulcher*
      - DD. Rays yellow: perennial.
        - E. St.-lvs. 1-pinnate. .... 7. *S. longuticus*
        - EE. St.-lvs. 2-3-pinnatisect. .... 8. *S. Jacobæa*
    - BB. St. woody or succulent-shrubby.
      - c. Heads radiate.
        - D. Lvs. 1½-8 in. broad: heads numerous. .... 9. *S. Petasitis*
        - DD. Lvs. ½-1¾ in. broad: heads solitary. .... 10. *S. Heritieri*
      - CC. Heads rayless. .... 11. *S. succulentus*

**1. S. mikanoides**, Otto (*S. scandens*, DC.). GERMAN-IVY. Slender and glabrous, tall-twining: lvs. ovate or deltoid-ovate, mostly with a deep basal sinus, sharply 5-7-angled or angle-lobed: heads small, discoid, yellow, in close clusters on axillary and terminal branches; involucre bracts shorter than the disk-fls. S. Afr.

**2. S. scandens**, Buch.-Ham., not DC. Sts. woody, climbing, reaching a height of several ft.; branches slightly hirsute: lvs. short-petiolate, ovate- or elliptic-lanceolate, undivided or with 2 or more divisions at base of blade, triangular-

dentate, grayish-green and finely pubescent on both surfaces: infl. a terminal panicle; heads radiate; rays commonly 8, yellow. China.

3. *S. Cineraria*, DC. (*Cineraria maritima*, L. *Senecio acanthifolius*, Hort.). DUSTY MILLER. Herbaceous perennial, 2½ ft. or less tall, branching from base, very white-woolly throughout: lvs. pinnatifid, with oblong obtuse segms.: heads usually radiate, ¼–½ in. high, disposed in small compact cymes; involucre with or without small accessory bracts at base. Fls. at all seasons in favorable climates. (*Cineraria*: Latin *ash*, from the ashy color of its foliage.) Medit. region.—A var. has very white foliage; another has lvs. bordered with orange-yellow.

4. *S. cruentus*, DC. (*Cineraria cruenta*, Mass.). FLORISTS CINERARIA. Short-stemmed, floccose-woolly: lvs. large, cordate-ovate to cordate-triangular, angled or undulate and sinuate-toothed, rather long-stalked: fls. purple-red. Canary Isls.—*S. cruentus* is the supposed parent of the florists cineraria now modified by cult., its large double fls. running in white and in shades of blue, pink and purple-red. Concerning the origin of this cult. form there are two views, one holding that it is a direct descendant of *S. cruentus*, the other that it is a hybrid into which *S. cruentus* and other Canary Isl. species have probably blended. The plant sold under the name *Cineraria stellata* (Star Cineraria) is an open grower, 2 ft. high, whose fl.-heads are single, mostly smaller and not borne in the solid masses of the florists cineraria. Its rays are separated as in the wild aster.

5. *S. elegans*, L. (*S. purpureus*, Hort. *Jacobæa elegans*, Moench). PURPLE RAGWORT. Viscid-pubescent annual, erect or diffuse, 1–2 ft. high: lvs. various, mostly oblong, 1–3 in. long, pinnate, lobed or toothed with sinuses chiefly broad and rounded, clasping at base: heads in loose corymbs; rays purple; disk-fls. yellow. S. Afr.—Fls. in one form double, in another white.

6. *S. pulcher*, Hook. & Arn. Robust erect perennial, 2–4 ft. high, white-cobwebby; st. simple or nearly so, scarcely leafy: lvs. oblong-lanceolate, 4–10 in. long, thick, shallow-lobed and crenate-toothed: heads 2–3 in. across, with many long red-purple rays and a yellow disk. Uruguay and Argentina.

7. *S. tanguticus*, Maxim. Stout herbaceous perennial, glabrous or nearly so; st. 6–7 ft. high, branched above, leafy: lvs. broadly ovate or deltoid, 5–7 in. long, pinnately divided into lanceolate coarsely and remotely toothed divisions, dark green above, paler beneath; petioles of lower lvs. long-dilated below into a somewhat clasping base: heads very numerous, radiate, disposed in a terminal pyramidal panicle; rays 3 or 4, yellow; disk-fls. 3 or 4, with revolute corolla-lobes. W. China.

8. *S. Jacobæa*, L. TANSY RAGWORT. Erect biennial or perennial herb; stg. 1–3 ft. high, leafy: basal lvs. petiolate, sub-lyrate; st.-lvs. sessile, 1½–6 in. long, ¾–2¾ in. broad, 2–3-pinnatisect: heads numerous, with yellow rays. (*Jacobæa*: ante-Linnæan substantive name.) Eu.

9. *S. Petasitis*, DC. (*Cineraria Petasitis*, Sims). VELVET GROUNDSEL. CALIFORNIA-GERANIUM. Robust perennial, 3–8 ft. high, somewhat velvety-hirsute on the younger parts: lvs. petiolate, broadly ovate or suborbicular, 1½–8 in. broad, cordate to subtruncate at base, sinuately 9–13-lobed, callous-denticulate, somewhat hairy above, more or less grayish-tomentose beneath: infl. a terminal many-headed panicle; heads radiate, about ½ in. high; rays usually 5, yellow; disk-fls. about 15; achenes glabrous. (*Petasitis*: Greek *broad-brimmed* or *sun-hat*, in reference to the large rounded lvs.; page 783.) S. Mex.

10. *S. Heritieri*, DC. Suffrutescent perennial, seldom over 1 ft. high; st. ascending or erect, at first white-tomentose, later glabrate: lvs. petiolate, suborbicular, ½–1¾ in. broad, 5–7-lobed, cobwebby-tomentose above in the young stages but soon glabrate, densely and permanently white-tomentose beneath: heads radiate, mostly solitary on an elongated nearly naked peduncle; rays about 13, purple. (Named for Chas. Louis l'Heritier du Brutelle, 1746–1800, French botanist.) Teneriffe.

11. *S. succulentus*, Schultes-Bip. (*Kleinia repens*, Harv. *Cacalia repens*, L.). Low, glabrous, the erect succulent-shrubby sts. from a creeping rootstock: lvs. clustered, fleshy, glaucous, terete, acuminate, somewhat flattened above: fl.-stalk naked, corymbosely branched at apex, bearing few heads; involucre somewhat campanulate, of 5–6 bracts with a few shorter bracts at base; fls. 15–16 or even 20–30. S. Afr.

63. LEONTOPODIUM, R. Br. Low plants of about 6 species, native to the mts. of Eu., Asia and S. Amer., one of them sometimes grown in rock-

gardens for ornament and interest.—Perennial herbs, tufted and woolly; sts. ascending or erect, simple or branched at the very top: lvs. entire, basal or those of the st. alternate: heads discoid, small, crowded into dense cymes at the top of the st., surrounded by a tuft of floral lvs.; bisexual fls. sterile: pappus-bristles united at base. (*Leontopodium*: Greek *lion's foot*.)

**L. alpinum**, Cass. (*Gnaphalium Leontopodium*, L.). EDELWEISS. White-woolly plant 4–12 in. high, creeping by rootstocks: lvs. oblong-oblancoate, entire, in age shedding the wool from their upper surface: heads 7–9, closely crowded together, surrounded by a tuft of densely and persistently white-woolly oblong or lanceolate floral lvs. which far surpass the heads; involucre bracts densely woolly, with blackish tips. Eu.

**64. AMMOBIUM**, R. Br. Two or 3 Australian species, one grown as an “everlasting.”—Perennial herbs (ours grown as an annual), more or less white-tomentose: lvs. alternate or basal: heads solitary at the ends of the branchlets, consisting of disk-fls. only, these yellow, bisexual and fertile, surrounded by an involucre of dry silvery-white bracts and subtended by chaffy scales: pappus of 2–4 teeth, or shortly cristate. (*Ammobium*: Greek *living in sand*.)

**A. alatum**, R. Br. WINGED EVERLASTING. Erect branching plant to 3 ft. high, white-woolly, the wool more or less deciduous in age; st. and branches conspicuously winged (sometimes merely angled): basal lvs. ovate at the ends and long-tapering below (javelin-shaped); st.-lvs. lanceolate, small and distant, entire or nearly so: heads 1–2 in. across; involucre bracts ovate, pearly white and petal-like, thickened and greenish at base, fluted and erose at tips.

**65. HELIPTERUM**, DC. About 48 species, native to S. Afr. and Australia, a few of them grown as “everlastings” or immortelles.—Mostly herbs, annual or perennial, more or less white-tomentose to glabrate: lvs. commonly alternate, entire: heads discoid, of few to many fls., solitary or clustered; fls. bisexual, yellow; involucre bracts in many series, the outer rows scarious or membranaceous, imbricated, the inner (in ours) mostly expanded and petal-like, white, yellow or rose-color, with thickened greenish or brownish basal portion: achenes in ours densely silky-hairy; pappus-bristles plumose at base. (*Helipterum*: Greek for *sun* and *wing*; said to refer to the light-plumed pappus.)

Heads large or medium-sized, solitary or in loose clusters of 2 or 3:  
plants glabrous.

Lvs. broad: peduncles with scarious bracts.....1. *H. Manglesii*

Lvs. linear or spatulate-linear: peduncles without scarious bracts. 2. *H. roseum*

Heads small, in rather close clusters of several to many: plant somewhat woolly.....3. *H. Humboldtianum*

1. **H. Manglesii**, Muell. (*Rhodanthe Manglesii*, Lindl.). Glabrous glaucous annual 1–1½ ft. high, with slender somewhat tortuous branches: lvs. thin, elliptic or ovate, entire, strongly clasping at base: heads showy, solitary or loosely clustered, nodding, on slender stalks, these bracteate, the bracts passing into those of the involucre; involucre consisting of several outer series of loosely imbricated ovate bracts which are silvery-scarious except at base (in one var. flecked with red), and of 2–3 series (many series in some vars.) of inner bracts resembling ray fls., clear pink varying to white or to dark red. (Named after James Mangles, an English naturalist, died 1867.) Australia.

2. **H. roseum**, Benth. (*Acroclinium roseum*, Hook. *Roccardia rosea*, Voss). Glabrous annual, 1–2 ft. high, with many strict simple branches from near the base: lvs. numerous, linear, spatulate-linear or the upper lanceolate: heads large, on short naked (or nearly so) peduncles, terminating the branches; involucre bracts of the outer rows ovate to oblong with brownish scarious tips, those of the inner rows much enlarged and petal-like, pink or white with thickened brownish or greenish basal portion. Australia.

3. **H. Humboldtianum**, DC. (*H. Sandfordii*, Hook.). Annual (or cult. as such), erect, or with a decumbent base, white-tomentose at least when young: lvs. linear or oblanceolate-linear, somewhat clasping: heads small, obconic, in a dense terminal corymb; outer involucre bracts in many series, brownish-scarious, imbricated, the inner 1–2 series with short spreading yellowish-green tips. (Named after Alex. von Humboldt, page 39.) Australia.

66. **HELICHRYSUM**, Gaertn. Species about 300 in Eu., Asia, Afr. and Australia, yielding two species for ornament.—Herbs or shrubs, commonly somewhat tomentose: lvs. alternate or the lower rarely opposite, entire: heads discoid, solitary or clustered at the ends of the branches; involueral bracts in many rows, imbricated and scarious or membranaceous, the inner often enlarged and white or gaily colored, petaloid, with thickened brownish bases; fls. yellow: pappus of bristles not plumose at base. (Helichrysum: Greek for *sun* and *gold*, referring to the fl.-heads.)

Lvs. oblong-lanceolate, glabrous or nearly so: heads solitary ..... 1. *H. bracteatum*  
Lvs. ovate, woolly: heads clustered ..... 2. *H. petiolatum*

1. **H. bracteatum**, Andr. **STRAWFLOWER**. Stout annual,  $1\frac{1}{2}$ –3 ft. high, somewhat branched, minutely scabrous-roughened: lvs. rather numerous, oblong-lanceolate, 2–5 in. long, tapering to short petiole: heads terminating the branches,  $1-2\frac{1}{2}$  in. across; outer involueral bracts short and obtuse, imbricated, those of the inner rows elongated and petaloid, yellow, orange, red or white, with thickened greenish basal portion: achenes glabrous. Australia; frequently grown as an "everlasting."

2. **H. petiolatum**, DC. (*Gnaphalium lanatum*, Hort.). Somewhat shrubby at base, the st. woolly: lvs. ovate, abruptly petiolate, very woolly: heads (not often seen in cult.) smaller, corymbosely disposed; involueral bracts oblong, obtuse, cream-white; ovary glabrous (achenes apparently not often maturing). S. Afr.; grown under glass and in the open for its vine-like shoots that cover rocks or hang from baskets.

67. **PODOLEPIS**, Labill. Herbs of about a dozen species native to Australia; one of them known as a flower-garden subject.—Annual (ours) or perennial, loosely woolly becoming glabrate: lvs. alternate, linear to lanceolate, entire: heads peduncled or rarely sessile at the tips of the branches; involuere hemispherical, the bracts imbricated, the inner stalked; rays yellow, pink or purple: pappus consisting of bristles. (Podolepis: Greek *foot* and *scale*, referring to the unusual fact that the involueral bracts have a foot-stalk or claw.)

**P. aristata**, Benth. (*P. chrysantha*, Endl.). Somewhat woolly-pubescent annual, leafy and branching, often exceeding 1 ft.: lvs. linear or lanceolate, clasping and often decurrent, terminating in a sharp point: heads solitary, the peduncle bearing scale-like bracts of which the upper are continuous with those of the involuere; involuere hemispherical, the bracts in many series, stalked, broadly ovate, abruptly acuminate and often cristate, all except the extreme basal portion scarious; rays yellow, 3–4-lobed, longer than the disk-fls.

68. **INULA**, L. Species about 56 in Eu., Asia and Afr., affording showy perennials for borders and flower-gardens.—Usually perennial herbs, more or less glandular and hairy: lvs. alternate or basal, entire or serrate, (in ours) mostly sessile: heads commonly radiate, solitary or clustered; rays pistillate, 3-toothed, yellow, rarely white; disk-fls. bisexual, with tubular corollas 5-toothed: achenes 4–5-ribbed; pappus consisting of bristles. (In-ula: ancient name.)

Lvs. glabrous except for the ciliate margins, narrowly linear-lanceolate ..... 1. *I. ensifolia*

Lvs. villous or tomentose.

Heads commonly paniced or corymbose.

Margin of lf. entire; lvs. silky-villous on both sides ..... 2. *I. Oculus-Christi*

Margin of lf. dentate-serrate; lvs. velvety beneath, hispid-rough-

ened above ..... 3. *I. Helenium*

Heads solitary.

Plants  $2\frac{1}{2}$  ft. high or more: outer involueral bracts linear.

Glands numerous: lvs. serrulate ..... 4. *I. grandiflora*

Glands remote: lvs. entire or slightly denticulate ..... 5. *I. glandulosa*

Plants  $1-1\frac{1}{2}$  ft. high: outer involueral bracts oblong-lanceolate ..... 6. *I. montana*

1. **I. ensifolia**, L. (*I. bubonium*, Hort.). St. simple, about 2 ft. high, villous beneath the heads: lvs. narrowly linear-lanceolate, with several somewhat parallel



nerves, the margins ciliate-serrulate, otherwise glabrous: heads large, yellow, solitary or in small clusters; outer involucre bracts linear-lanceolate, leafy. Eu., N. Asia.

2. *I. Oculus-Christi*, L. Erect somewhat branched perennial, with villous sts., 2 ft. high: lvs. entire, silky-villous on both sides, the lower oblong-spatulate, tapering to a long petiole, the upper oblong-lanceolate, clasping: heads yellow, the many narrow rays twice as long as the involucre bracts. (*Oculus-Christi*; old name, meaning *eye of Christ*, alluding to the fls.) Eu.

3. *I. Helenium*, L. ELECAMPAINE. Tall herb from thick perennial root: lvs. large, unequally dentate-serrate, velvety beneath, hispid-roughened above, the basal elliptic-oblong, to 2 ft. long, narrowed to a petiole, the st.-lvs. oblong-ovate, cordate-clasping: heads large, solitary or few terminating the st. or flowering branches; outer involucre bracts leafy, ovate; rays yellow, very many, long and slender. (*Helenium*: of doubtful significance; page 779; herbalist name.) Eu., N. Asia.

4. *I. grandiflora*, Willd. St. simple, villous, 3-4 ft. high: lvs. elliptic-oblong, serrulate, all sessile, finely villous and with numerous glands, the lower 2-4 in. long: heads solitary, orange-yellow,  $3\frac{1}{4}$ -5 in. across. Himalayas, Caucasus.

5. *I. glandulosa*, Willd. Erect, somewhat hairy, the simple st. leafy to the top,  $2\frac{1}{2}$ -4 ft. high: lower lvs. oblong-spatulate, long-attenuate at base, the uppermost oblong with subcordate-decurrent base, all entire or very obscurely denticulate and with remote glands at the margin: heads solitary, smaller than in *I. grandiflora*, yellow; involucre bracts linear-subulate, hairy. Caucasus.—A var. has fringed half-drooping golden-yellow rays.

6. *I. montana*, L. Perennial about 1-1½ ft. high, with erect villous mostly simple st.: lvs. lanceolate, entire, villous, the basal narrowed to a petiole: heads solitary, with many narrow yellow rays; outer involucre bracts oblong-lanceolate and somewhat obtuse, the inner ones acute: achenes hairy. S. Eu.

69. *PIQUERIA*, Cav. Trop. American shrubs or seldom herbs, of about 20 species, one common under glass.—Lvs. opposite, entire or toothed: heads small, thickly clustered; involucre campanulate, the bracts in 2 series; anthers not appendaged at apex: achene 4-5-angled; pappus none or very short. (*Pique-ria*: A. Piquerio, Spanish physician of 18th century.)

*P. trinervia*, Cav. (*Stevia serrata*, Hort., not Cav.). Perennial: lvs. lanceolate to oblong-lanceolate, serrate-dentate, in one var. broadly white-edged: heads small, 3-5-fl., borne in small paniced corymbs, each cluster terminating a slender axillary branch or peduncle; fls. tubular, whitish, fragrant: achene 4-5-angled. Fls. till frost or in greenhouses winter-blooming. Mex., Cent. Amer. and Hayti.

70. *EUPATORIUM*, L. THOROUGHWORT. BONESET. At least 600 species, chiefly of Mex., the W. Indies and trop. S. Amer., yielding good greenhouse plants and also subjects for the hardy border.—Mostly perennial herbs, a few species annual, many of the trop. ones shrubby or even arborescent: lvs. mostly opposite: heads rayless, mostly in dense flat-topped or rounded clusters, less frequently in open panicles; involucre cylindric to hemispherical, its bracts in 2 to many overlapping ranks; fls. bisexual, mostly 5 or more (rarely 1-4) in each head, purple, rose-colored or white, more rarely lilac or bluish-violet, never yellow; style-branches long, thread-like or club-shaped, protruding far out of the corolla-tube: achenes 5-angled, crowned with a well-developed pappus of hair-like mostly white bristles. (*Eupato-rium*: named for an ancient king of Pontus, said by Pliny to have employed one of this group of plants in medicine.)—The native Joe-Pye weed, *E. purpureum*, L., and associates, is likely to be transferred to grounds, as also the common white boneset, *E. perfoliatum*, L.

A. Fls. pink, purple, lilac, blue or violet.

B. Lvs. (or some of them) alternate, oblong-lanceolate: fls. at first white, at maturity vivid rose-color. .... 1. *E. Lassequii*

BB. Lvs. opposite, triangular-ovate: fls. light blue to violet. .... 2. *E. caelestinum*

AA. Fls. white or nearly so (pappus sometimes colored).

B. Blade of lf. decurrent and crisped on short petiole. .... 3. *E. micranthum*

## BB. Blade of lf. not decurrent on petiole.

c. Lvs. sharply toothed, thin, acuminate.

d. Shape of lf. ovate. 4. *E. urticæfolium*dd. Shape of lf. lanceolate. 5. *E. riparium*

## cc! Lvs. bluntly toothed or entire.

d. Plant pubescent, not becoming glabrate.

e. Pubescence not glandular.

f. Apex of lf. blunt or scarcely pointed: sts. not densely pubescent. 6. *E. aromaticum*ff. Apex of lf. taper-pointed: sts. densely pubescent. 7. *E. vernale*EE. Pubescence glandular: lvs. thinnish, taper-pointed or acute. 8. *E. glandulosum*

DD. Plant sparingly hairy or soon glabrate.

E. Margin of lf. nearly or quite entire. 9. *E. glabratum*EE. Margin of lf. toothed. 10. *E. glechonophyllum*

1. *E. Lasseauxii*, Carr. (*Ageratum Lasseauxii*, Carr.). One to 2 ft. high, densely covered with short glandular hairs: lvs. alternate, oblong-lanceolate, narrowed at each end, bluntly toothed: heads in small compact unequally stalked clusters; florets very numerous, at first white, at maturity a vivid rose-color. (Named after M. Lasseaux, who first sent the seeds of this species to France.) Temp. S. Amer.

2. *E. cœlestinum*, L. (*Conoclinium cœlestinum*, DC.). MIST-FLOWER. Perennial herb 1-3 ft. high, branching and somewhat pubescent: lvs. opposite, petioled, triangular-ovate, somewhat cordate, thin, coarsely toothed: heads in compact clusters, many-fl., light blue to violet; involucre bracts narrowly linear, attenuate, purple-tipped, in 2 series. Fls. late. N. J. to Mich., Kans. and southward.

3. *E. micranthum*, Less. (*E. Morisii*, Hort. *E. Weinmannianum*, Regel & Koern.). Upright shrub: lvs. opposite, elliptic-lanceolate, pinnately veined, the blade somewhat toothed and slightly decurrent in narrow crisped wings on the short petiole: heads small, few-fl., very numerous in a large round-topped terminal corymb; fls. white, but pappus pink-tinged to deep rose. Mex.

4. *E. urticæfolium*, Reichard (*E. ageratoides*, L. f. Sometimes in the trade as *E. Frascri*, Hort.). WHITE SNAKE-ROOT. Smoothish branching herb 2-4 ft. high: lvs. mostly opposite, thin, long-petioled, ovate with broad base, acuminate, coarsely and sharply serrate, green on both sides: heads small, in loose but ample clusters; fls. bright white, in summer. E. N. Amer.

5. *E. riparium*, Regel. Diffuse, becoming woody at base, 2 ft. high; sts. slender, puberulent and usually reddish: lvs. opposite, long lance-shaped, taper-pointed and at base narrowed to a petiole, prominently 3-ribbed, serrate: heads in rather compact long-stalked clusters. Mex.

6. *E. aromaticum*, L. Much like *E. urticæfolium* but usually hairy: lvs. thickish and blunt or scarcely pointed, blunt-toothed: late-flowering, not aromatic. Mass. and southward near the coast.

7. *E. vernale*, Vathek & Kurtz. (*E. triste*, Hort., not DC.). Strong herb (slightly woody in the wild), with hairy sts.: lvs. oblong-ovate, long-petioled, taper-pointed, serrate, finely hairy above, paler and grayish velvety beneath, veiny, 3-5 in. long: fls. bright white, the heads in an ample terminal corymb; involucre bracts long, narrow, green. Sept. Mex.

8. *E. glandulosum*, HBK. (*E. adnanthum*, Hort. *E. americanum*, Hort.). Diffuse and often decumbent herb, the slender round branches, petioles, and pedicels finely glandular-puberulent: lvs. triangular-ovate or rhombic-ovate, thinnish, slender-petioled, taper-pointed, coarsely and sometimes unevenly crenate-dentate, sparingly puberulent beneath: heads pure white, ageratium-like, in close clusters; involucre bracts nearly equal. Late autumn and early winter. Mex.

9. *E. glabratum*, HBK. (*E. elegans*, Hort. *E. latifolium*, Hort.). Shrubby, erect, with slender hard glabrous brown sts.: lvs. of firm texture though scarcely leathery, small, lance-oblong or ovate-oblong, tapering into a strong petiole, blunt or pointed, wavy-margined or small-toothed: fls. (sometimes blush) in ascending cymose clusters, together forming a long terminal leafy panicle; involucre bracts obtuse, unequal and imbricated, viscid. Uplands of Mex.

10. *E. glechonophyllum*, Less. (*Ageratum conspicuum*, Hort.). Low branching half-shrub, very leafy: lvs. small,  $\frac{1}{2}$ -1 (rarely 2) in. long, triangular-ovate, sharp-pointed, bluntly few-toothed, thin and nearly glabrous, on slender stalks: heads borne on thread-like pedicels in small or medium-sized flattish clusters. Chile.

71. **AGERATUM**, L. Mostly trop. American herbs, of about 30 species, two frequently cult. in flower-gardens.—Herbs or shrubs, ours annual, mostly loose-growing, 1-2 ft. high, with compact dwarf and variegated forms: lvs.

mostly opposite, ovate, crenate-serrate, petiolate: heads tassel-like, clustered; involueral bracts narrow, subequal, in 2-3 series; receptacle naked or with scales; fls. all tubular, blue (rarely pink) or white; anthers appendaged: achenes 5-angled; pappus of separate or united scales. (*Ager-atum*: Greek *not growing old*, first applied to some everlasting.)

Involueral bracts sparingly if at all hairy on back: lvs. commonly blunt or rounded at base.....1. *A. conyzoides*

Involueral bracts densely and somewhat viscidly hairy on back: lvs. commonly heart-shaped at base.....2. *A. Houstonianum*

1. *A. conyzoides*, L. Lvs. blunt or rounded at base, rarely heart-shaped: heads seldom  $\frac{1}{4}$  in. across; fls. blue or white; involueral bracts oblong, abruptly acuminate, sparingly if at all hairy on the back, erose and ciliate. Fls. all summer. In most warm countries.

2. *A. Houstonianum*, Mill. (*A. mexicanum*, Sims). Lvs. usually heart-shaped at base: heads commonly a little more than  $\frac{1}{4}$  in. across; fls. blue; involueral bracts lance-linear, attenuate, entire, ciliate, the back finely, densely, and somewhat viscidly hairy. Fls. all summer. (Named after Wm. Houston, American physician who collected plants in the Antilles and Mex., died 1733.)

72. *ECHINOPS*, L. (*Sphærocephalus*, Kuntze). **GLOBE THISTLE**. Species about 60 from Spain and Portugal to India and Abyssinia, two grown for their foliage and large prickly heads.—Coarse thistle-like herbs, ours perennial, with sts. and lower surfaces of lvs. more or less white-woolly: lvs. alternate, usually pinnately toothed or 2-3-pinnatisect, the teeth and lobes prickly: fls. in globose involucrate heads, each fl. with a little involucre of its own: achenes elongate, 4-angled or nearly terete, usually villous, crowned by a pappus of many short scales. (*Echi-nops*: Greek *like a hedge-hog*, alluding to the spiny involueral bracts.)

Plant not glandular-sticky: upper surface of lvs. lightly tomentose or with scattered spinules or glabrate.....1. *E. Ritro*

Plant glandular-sticky: upper surface of lvs. rough-pubescent.....2. *E. sphærocephalus*

1. *E. Ritro*, L. Bushy perennial 2-6 ft. high, without glands: lvs. 1-2-pinnatifid into lanceolate spinose-toothed segms., the upper surface lightly cobwebby-tomentose or with scattered spinules or becoming glabrate, the lower densely gray-tomentose: outer bristle-like bracts of the individual head one-third to one-fourth as long as the broad keeled bristly-ciliate and spinose-tipped bluish inner ones in which the back is glabrous; fls. blue to white; upper hairs of achene surpassing pappus which is formed of plumose hairs fused only at base. Fls. all summer. (*Ritro*: name of this plant in S. Eu.) S. Eu.

2. *E. sphærocephalus*, L. Bushy perennial 3-7 ft. high, the forked st. and fl.-stalk gray-woolly and glandular-sticky: lvs. sinuate-pinnatifid into oblong-triangular spinose-dentate lobes, the upper surface green, pubescent and more or less glandular, the lower surface white-tomentose or arachnoid: outer bristle-like bracts of the individual heads about one-half as long as the inner which are fimbriate at the middle, oblong contracted to a point, and with the back pubescent; fls. blue: achenes cylindric-oblong with yellow appressed hairs which do not surpass the cup-shaped toothed pappus. Late summer and autumn. S. Eu.

73. *ARCTIUM*, L. (*Lappa*, Juss.). **BURDOCK**. About a half-dozen species of very coarse rank-smelling large-leaved bur-bearing biennials or short-lived perennials, scarcely known as ornamentals but of medicinal reputation and one sometimes grown for its edible roots; native in Eu. and Asia, some of them widely distributed as rank weeds of yards and neglected places.—Lvs. alternate, tomentose or soft-pubescent at least beneath, cordate and undivided: heads many and clustered, the fls. all tubular and little projecting from the tight globose or urceolate involucre, the bracts of which are produced into long hooked tips so that the whole head becomes a bur; fls. bisexual, purple to nearly white; receptacle setose: achenes oblong and somewhat compressed, more or less 3-angled; pappus of short serrulate deciduous scales. (*Arct-ium*: Greek *bear*, probably from the bur-like involucre.)

Bracts of involucre flat, straight and spreading, all equaling the fls.: heads usually exceeding 1 in. diam. .... 1. *A. Lappa*  
 Bracts angled or very narrow, curving and less spreading, at least the inner ones shorter than the fls.: heads usually less than 1 in. diam. .... 2. *A. minus*

1. **A. Lappa**, L. (*Lappa major*, Gaertn. *L. edulis*, Sieb.). GREAT BURDOCK. Gobo of the Japanese. Very stout, much branched, to 8 ft., a frequent weed, but to be looked for as a cult. plant with the Japanese, the straight young roots esteemed as a vegetable when the plant is a few months old and the roots 10-15 in. long and  $\frac{1}{2}$  in. or less thick or in larger sizes 2 ft. long and 1 in. thick at top: lower lvs. broadly cordate-ovate and obtuse, the blade sometimes 20 in. and more long, canescent or floccose-tomentose beneath: heads about  $1\frac{1}{2}$  in. broad with the spread of the bracts, aggregate into flat-topped or corymb-like clusters. (*Lappa* is an ante-Linnaean name, signifying the clinging nature of the burs.)—The plant is handled essentially as an annual in Japan, seed of early vars. sown in May and roots taken in autumn, of late vars. sown in Aug. and roots taken in spring.

2. **A. minus**, Schkuhr (*Lappa minor*, DC.). COMMON BURDOCK, and sometimes grown for medicinal purposes: smaller than No. 1, 3-4 ft. or to 6 ft. in cult.: lvs. similar but smaller: heads usually about  $\frac{3}{4}$  in. broad with the less spreading or not reflexed curved narrow bracts, placed along the branches in a racemose order: a common weed.

74. **XERANTHEMUM**, L. Annual herbs of the Medit. region, about 6 species, one grown in the flower-garden.—Densely pubescent or tomentose, with branching leafy sts.: lvs. narrow, entire, not spinose: heads solitary on long naked peduncles; outer involucre bracts well-imbricated, the inner elongate, petal-like and persistent; receptacle chaffy; outer fls. few and sterile, inner ones fertile: pappus a single row of pointed scales. (*Xeran-themum*: Greek *dry flower*; one of the everlasting.)

**X. annuum**, L. Erect, branching, 2-3 ft. high, white-tomentose: lvs. oblong to oblong-lanceolate, sharply acute,  $\frac{1}{2}$ -2 in. long: heads purple, 1- $1\frac{1}{2}$  in. across, the inner involucre bracts elongate, wide-spreading and petal-like. Aug. S. Eu.—One of the oldest and best-known of the "everlastings" or immortelles. Runs into many vars. differing in size and color of heads.

75. **CENTAUREA**, L. A prominent genus of some 500 species mostly in Eu., Asia and N. Afr., 1 in N. Amer., 3 or 4 in Chile, many of them cult. for their fls.—Annual or perennial herbs (rarely somewhat shrubby), with entire or pinnately lobed or divided lvs.: heads rather small to very large, solitary or panicked; involucre ovoid or globose, the bracts often appendaged and fringed, sometimes prickly; receptacle bristly; fls. purple, blue, yellow, or white, the marginal ones sometimes sterile and elongated, making the head look as if rayed. (*Centaure-a*: a *Centaur*, famous for healing.)

- a. Herbage white-tomentose throughout.
  - b. Lf.-lobes broad, rounded off at apex: fl.-heads rather large, not hidden by the lvs. .... 1. *C. Cineraria*
  - bb. Lf.-lobes linear, tapering toward apex: fl.-heads small, mostly hidden by the lvs. .... 2. *C. gymnocarpa*
- aa. Herbage not white-tomentose throughout (except sometimes when young).
  - b. Involucral bracts and their appendages entire.
    - c. Plant annual, 1-2 ft. high: pappus uniform. .... 3. *C. moschata*
    - cc. Plant perennial, 3 ft. high: inner pappus shorter than the outer. .... 4. *C. ruthenica*
  - bb. Involucral bracts or their appendages fringed or ciliate.
    - c. Lvs. entire or merely toothed.
      - d. Marginal fls. of head larger than interior ones.
        - e. Fl.-heads 3-5 in. across; involucre bracts with fringed appendages. .... 5. *C. americana*
        - ee. Fl.-heads  $1\frac{1}{4}$ - $2\frac{1}{4}$  in. across; involucre bracts with fringed or ciliate margins.
          - f. Shape of lvs. linear: plant annual. .... 6. *C. Cyanus*
          - ff. Shape of lvs. broadly lanceolate to obovate-lanceolate: plant perennial. .... 7. *C. montana*
      - dd. Marginal fls. of head seldom larger than interior ones.
        - e. Bracts of involucre with scarious fringed margin: lvs. somewhat serrate. .... 8. *C. macrocephala*



- EE. Bracts of involucre with blackish fringed margin: lvs. entire  
or the lower sparsely toothed..... 9. *C. nigra*  
CC. Lvs. pinnatifid.  
D. Fls. red or the marginal white: lvs. tomentose beneath..... 10. *C. dealbata*  
DD. Fls. yellow: lvs. smooth or scabrous..... 11. *C. orientalis*

1. *C. Cineraria*, L. (*C. candidissima*, Lam.). DUSTY MILLER. Erect branching perennial 1-1¼ ft. high, the entire plant white-tomentose: lvs. pinnately parted into broad very obtuse lobes, the lower petioled, all the lobes linear-lanceolate, obtuse: bracts rather large; bracts of the ovate involucre appressed, with a membranaceous black margin, long-ciliate, the apical bristle thicker than the others; fls. golden-yellow or purple. (*Cineraria*: Latin *ashy*, referring to the color of the foliage, adopted from herbalist sources.) S. Italy, Sicily, etc.

2. *C. gymnocarpa*, Moris & DeNot. (*C. argentea*, Hort. *C. plumosa*, Hort.). DUSTY MILLER. Erect perennial 1½-2 ft. high, covered throughout with felt-like white tomentum: lvs. bipinnately cut into linear entire acutish segms.: heads small, closely paniced, mostly hidden by the lvs. or arising from near the base of the plant; fls. rose-violet or purple: achenes mostly silver-gray, without pappus. Capri.

3. *C. moschata*, L. (*C. suaveolens*, L. *C. odorata*, Hort.). SWEET SULTAN. Green glabrous annual, erect, branching below, to 2 ft. high: lvs. toothed or pinnatifid and the lobes dentate: fls. white, yellow or purple, fragrant, in long-peduncled heads; involucre round or ovate, the bracts and their appendage entire, the innermost bracts with scarious margins. Orient.

4. *C. ruthenica*, Lam. Glabrous erect branching perennial 3 ft. high: lvs. pinnatisect into linear-toothed lobes, sharply narrowed at both ends, the base often somewhat decurrent: heads usually solitary, the pale yellow marginal fls. about ¾ in. long. Cent. Eu.

5. *C. americana*, Nutt. BASKET-FLOWER. Nearly glabrous annual; st. stout, simple or nearly so, 2-5 ft., thickened under the naked head: lvs. mostly entire, oblong-lanceolate, mucronate: heads 3-5 in. across; involucre 1-1½ in. diam., its numerous bracts all with fringed scarious appendages; fls. rose- or flesh-colored, sometimes purplish, the bisexual ones forming a disk 1-3 in. diam., the neutral outer ones with narrow lobes often 1 in. long. Mo. and Ark. to La. and Mex.

6. *C. Cyanus*, L. CORNFLOWER. BACHELORS BUTTON. BLUE-BOTTLE. Slender branching annual 1-2 ft. high, woolly-white only when young: lvs. linear, entire or the lower toothed, sometimes pinnatifid: heads naked on slender peduncles; involucre bracts rather narrow, fringed with short scarious or blackish teeth; fls. blue, purple, pink or white, the marginal ones enlarged and ray-like. (*Cyanus*: Greek *blue*, referring to the color of the fls.; an herbalist name.) S. E. Eu.

7. *C. montana*, L. MOUNTAIN BLUET. Perennial 12-16, rarely 20 in. high; sts. usually unbranched, stoloniferous: lvs. broadly lanceolate or obovate-oblongate, decurrent, the younger ones silvery-white: involucre bracts in 4 or 5 rows, their margins black-ciliate; fls. blue (variously colored in vars.), the marginal ones 1 in. long. Eu.

8. *C. macrocephala*, Puschk. Erect perennial 2½-3 ft. high, the simple leafy sts. swollen below the fl.-head: lvs. ovate-lanceolate, slightly decurrent, acute, somewhat serrate, scabrous, gradually diminishing upward to the base of the single terminal head: head subglobose, often 3-4 in. diam.; involucre of 8-12 rows of appressed scarious-margined fringed rusty bracts; fls. yellow, all alike. Armenia.

9. *C. nigra*, L. KNAPWEED. HARDHEADS. Rough-pubescent branching perennial 1-2 ft. high: lvs. lanceolate, entire, or the lower broader and sparsely toothed, in one var. white-margined: involucre bracts with pectinate-ciliate-fringed blackish appendages; fls. all bisexual, the marginal ones seldom enlarged. Eu.

10. *C. dealbata*, Willd. Suberect perennial 8-24 in. high: lvs. white-tomentose beneath, glabrous above, the lower ones 1-1½ ft. long, petioled, pinnate, the obovate lobes coarsely cut-toothed or auricled at base; st.-lvs. mostly sessile, pinnately divided, with oblong-lanceolate decurrent lobes: head solitary, just above the uppermost lf.; outer involucre bracts with lanceolate tips, the middle rounded, all deeply fringed and ciliate; inner fls. red, marginal ones rosy or white. Asia Minor, Persia.

11. *C. orientalis*, L. Perennial 3 ft. high, the upright branches somewhat tomentose: lvs. leathery, smooth or scabrous, the lower mostly bipinnatifid into lanceolate lobes, the upper pinnatifid: heads yellow, the involucre bracts prolonged into dry pale or reddish appendages. Eu.

76. **CARTHAMUS**, L. Species about 20, from the Canary Isls. to Cent. Asia, one cult. for the fls. which have various economic uses, as the yielding of dye; also ornamental.—Annuals with spiny lvs.: involucre with spreading leafy outer bracts and more or less spiny inner ones; receptacle chaffy; corolla 5-fid, nearly regular, expanded above the tube: achenes glabrous, mostly 4-ribbed, the pappus none or scale-like. (*Carthamus*: Arabic name, alluding to a color yielded by the fls.)

**C. tinctorius**, L. **SAFFLOWER**. **FALSE SAFFRON**. One to 3 ft. high, glabrous, branched: lvs. broadly ovate, minutely spinose-toothed: heads large, surrounded by a cluster of leafy bracts which pass over gradually into the bracts of the involucre; inner bracts of involucre spine-tipped; fls. orange-color. Asia.

77. **CNICUS**, Gaertn. **BLESSED THISTLE**. One species, native to the Medit. region and the Caucasus.—Thistle-like branching annual: heads sessile, surrounded by a cluster of large bristly leafy bracts; involucre bracts in few rows, the outer tipped with a long simple spine, the inner terminating in a long spinose-pinnatifid thorn: pappus-bristles in 2 series, the inner longer than the outer. (*Cnicus*: Latin name of safflower, early applied to thistles; pronounced *nî-kus*.)

**C. benedictus**, L. (*Cardus benedictus*, Auth.). To 2 ft. high: lvs. oblong, sinuate-pinnatifid and toothed, the lobes and teeth spiny: heads 1 in. wide, terminating the branches; fls. yellow.—Sometimes cult. for curiosity or ornament.

78. **ONOPORDUM**, L. Coarse, woolly, thistle-like annuals or biennials of the Old World, about 20 species, one not infrequent in gardens for ornament.—Sts. stout (sometimes acaulescent), winged by the decurrent lf.-bases: lvs. large, alternate, prickly dentate or pinnately cut: heads large, solitary or clustered; involucre globose, the bracts sometimes spiny; receptacle flat, fleshy, honeycombed, not bristly: pappus of bristles in several series. (*Onopordum*: old Greek name.)

**O. Acanthium**, L. **SCOTCH THISTLE**. White-cottony-tomentose biennial, vigorous, much-branched, 3-9 ft. high: lvs. oblong, prickly, sinuate-lobed and toothed, acute, the lower often 1 ft. long: heads  $1\frac{1}{2}$  2 in. across, usually borne singly on the branches; fls. pale purple, in a var. white. (*Acanthium*: Greek *thorn*; herbalist name.) Eu.

79. **CARDUUS**, L. **PLUMELESS THISTLE**. About 80 species from the Canary Isls. to Japan, little known in gardens.—Stout annual, biennial or perennial herbs with sessile spinose-toothed or -lobed lvs. often decurrent at base in form of spinose-toothed wings: heads large or medium-sized, solitary or in more or less crowded panicles; outer and middle involucre bracts spine-tipped, the inner unarmed and often colored; corollas tubular, 5-cleft into long narrow lobes: pappus-bristles non-plumose or indistinctly serrulate, united in a ring at base and falling together. (*Carduus*: ancient Latin name for these plants.)

**C. Kernerii**, Hort. Glabrous biennial, possibly perennial, much-branched, forming a plant 3 ft. each way; st. with spinose-toothed or -lobed wings extending to heads or nearly so: heads solitary or in pairs, 2-2½ in. across; involucre bracts lanceolate, rather weakly spine-tipped; fls. rose-purple. (Named after J. S. v. Kerner, 1755-1830, professor of botany in Stuttgart.) Probably from the Balkans; a striking plant but apparently little grown.

80. **SILYBUM**, Gaertn. Two species, Eu., Afr. and Asia, one rarely grown for ornament.—Glabrous, erect, thistle-like herbs: lvs. with spinose-toothed lobes, conspicuously white-spotted above: heads large, solitary, terminal, nodding; involucre broadly subglobose, the bracts in many rows; fls. purplish, all bisexual; corolla-tube slender, the limb 5-cleft to middle or base: pappus-bristles in several series. (*Silybum*: an old Greek name applied by Dioscorides to some thistle-like plants.)

**S. Marianum**, Gaertn. (*Carduus Marianus*, L.). ST. MARYS, BLESSED or HOLY THISTLE. Glossy-leaved annual or biennial 1-4 ft. high: lvs. clasping,  $1\frac{1}{2}$ - $2\frac{1}{2}$  ft. long: heads  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. across; involucre bracts leathery, with a spine  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, or the outer mucronate; receptacle fleshy; fls. rose-purple: achenes transversely wrinkled or smooth, black or gray. (Marianum, Mary, Mother of Christ; of early usage.) S. Eu., N. Afr. and Asia.—Known as Milk Thistle in Calif. where it is widely spread as an introduced weed.

81. **CYNARA**, L. Ten or 12 species in the Medit. region and Canary Isls., two of which are grown as garden vegetables.—Thistle-like perennial herbs, mostly coarse and sometimes prickly: lvs. commonly large, variously lobed or pinnatisect: heads large, terminating important branches, the corollas violet, blue or white; involucre broad or nearly globular, with bracts in many series and more or less enlarged at base; receptacle fleshy and plane, bristly; corolla slender-tubed, 5-parted: fr. a thick glabrous compressed or 4-angled achene with truncate apex. (Cyn-ara: involucre-spines likened to a dog's tooth.)

Lvs. prominently spiny: involucre bracts spinose-tipped.....1. *C. Cardunculus*  
Lvs. hardly at all spiny: involucre bracts unarmed.....2. *C. Scolymus*

1. **C. Cardunculus**, L. CARDOON. Robust plant to 6 ft. high or more, cult. for its edible root and thickened lf.-stalks, also sometimes for ornament: lvs. very large, deeply pinnatifid, grayish-green above, whitish beneath with dense tomentum, prominently spiny: heads purple-fld. with spine-tipped involucre bracts. (Cardunculus: diminutive of *Carduus*.) S. Eu.

2. **C. Scolymus**, L. ARTICHOKE. Less stout than the cardoon, usually 3-5 ft.: lvs. less pinnatifid, hardly at all spiny: heads larger, the receptacle enlarged and fleshy; involucre bracts broad, thickened at base, unarmed. Probably a derivative of the last.—Cult. for the soft fleshy receptacle of the fl.-head and the thickened base of the involucre bracts which are edible.

82. **CHAMÆPEUCE**, DC. About a dozen herbaceous or somewhat shrubby species, native to the Old World, one cult. for its foliage.—Lvs. spinose-toothed, rarely decurrent: heads terminal or subsessile in the axils; involucre bracts ovate, acuminate, more or less spine-tipped, imbricated in many series; fls. purple or some vars. white: achenes with hard covering (this distinguishing the genus from *Cirsium* whose achenes have a membranaceous coat); pappus of plumose bristles, in 1-2 series united at base and deciduous in a ring. (Chamæpeu-ce: Greek *small* and *spruce* from the shape of the lvs.)

**C. Diacantha**, DC. (*Cirsium Diacanthum*, DC.). FISHBONE THISTLE. Herbs with tomentose branching sts.: lvs. glabrous and shining green above, with white veins, white-tomentose beneath, linear-lanceolate and half-clasping, with small distant teeth tipped with usually a pair of ivory-white spines: involucre somewhat tomentose, its bracts tipped with a strong 3-angled spine which in the lower is recurved, in the middle is erect and much longer, and in the innermost is purple, erect and dry-membranaceous. (Diacantha: substantive, Greek *double* and *thorn*, from the paired thorns of the lvs.) Asia Minor.

83. **STOKESIA**, L'Her. STOKES ASTER. One species, native to N. Amer., cult. for its fls.—Coarse perennial herbs: lvs. spinose-toothed toward base or entire, the lower petiolate, the upper sessile: heads large, many-fld., terminating the branches; involucre bracts in many series, the outer leafy, the inner with foliaceous pinnately spinose-toothed appendages; receptacle fleshy, flat, naked; marginal fls. much larger than the inner, deeply 5-lobed. (Stoke-sia: Jonathan Stokes, M. D., 1755-1831, English botanist.)

**S. laevis**, Greene (*S. cyanea*, L'Her.). One to 2 ft. high, much-branched, the young branches often tomentose: lvs. broad-lanceolate, acute, 2-8 in. long: heads blue or purplish-blue (in vars. lavender or white), 3-4 in. across. S. C., Ga. to La.





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